8391

C
064

NATIONAL
SMOKE ABATEMENT SOCIETY

THE ROYAL SOCIETY
for the Promotion
OF HEALTH
LIBRARY

THE ROYAL SANITARY INSTITUTE
LIBRARY

PROCEEDINGS
# of the
BRIGHTON CONFERENCE
1946

Please Return by:-

21 APR 1950
[illegible]8 NOV 1951
25 JUL 1952
15 MAR 1954

pam
WA750
1946
N27p

lings

CHANDOS HOUSE,
BUCKINGHAM GATE
LONDON, S.W.1.

SOME RECENT PUBLICATIONS OF THE N.S.A.S.

Smokeless Zones.

A pamphlet explaining the Society's proposals for progressively ending the smoke nuisance by setting up smokeless zones. Of especial importance in view of the powers just obtained by Manchester Corporation for establishing smokeless zones in that city - - **3d.**

1945 Conference Report.

Full proceedings of the joint conference with the Institute of Fuel, held in London, 23rd February, 1945. 8 papers and discussions. 45,000 words - - - - - - **2/6d.**

Smoke Control.

Suggestions to Local Authorities for Guidance and Control under existing legislation in respect to smoke prevention in new fuel-burning installations - - - - - **3d.**

The Smoke Problem and Science Teaching.

A successful booklet for teachers, with notes and experiments. Also of general interest and value to speakers and writers - **3d.**

Constitution of the N.S.A.S.

The new constitution of the Society in booklet form - **2d.**

All post free
Reduced prices for quantities
See inside back cover for other publications

22900334477

Proceedings of the

THIRTEENTH ANNUAL CONFERENCE
of the
National Smoke Abatement Society

Held in Brighton

24th to 26th OCTOBER, 1946

CONTENTS

Page

Message to the Conference from the Lord President of the Council, the Rt. Hon. Herbert Morrison, M.P. 3

Presidential Address, by Sir George Elliston, M.C., M.A., J.P., D.L. 4

Smoke Prevention in New Houses—

Scotland, by Allan Ritchie, M.B.E., F.R.San.I. 9
North East, by A. Stuart Hebblethwaite, M.C., M.B., Ch.B., D.P.H. 11
North West, by C. Metcalfe Brown, M.D., D.P.H. 13
West Riding of Yorkshire, by J. Johnstone Jervis, M.D., D.P.H. 15
Sheffield, Rotherham & District, by James Law 17
West Midlands, by W. R. Martine, O.B.E., T.D., M.D., D.P.H. 19
East Midlands, by Alfred Wade, F.R.San.I. 21
Bristol & District, by Geo. E. Curtis, F.S.I.A. (Read by F. J. Redstone) 23
Greater London, by Clifford Ratcliff 24
Other Areas, compiled by the Society 27
Summary and Discussion 29

Proposals for New Industrial Legislation—

The Fuel Technologist's Viewpoint, by Sidney N. Duguid, B.Sc.Tech., F.Inst.F., F.R.San.I. 37
The Smoke Inspector's Viewpoint, by George W. Farquharson 39
The Stoker's Viewpoint, by Ernest Bowles 41
The Industrialist's Viewpoint, H. A. Humphrey, M.I.C.E., M.I.Mech.E., M.I.E.E., F.Inst.F. 43
Discussion 63

What of the Future ?

By Charles Gandy, B.A. 68
Discussion 75

Conference Resolutions 84

The opinion expressed in papers and discussions at Open Conferences of the Society are not necessarily the same as the Society's official views or policy.

CONTRIBUTORS TO THE DISCUSSIONS

Smoke Prevention in New Houses

Marsh, Arnold 29
Cross, D. Cleave 30
Beaumont, W. 31
Sweeney, Counc. A. 32
Marsland, G. Gould 32
Duffus, Counc. J. 32
Dale, Counc. Mrs. M. 33
Cool, Counc. J. 33
Foakes, W. W. 33
Chaplin, Counc. A. H. 33
Burnip, Counc. J. 33
Stansbury, C. A. 34
Ogden, Counc. A. J. 34
Lea, Mrs. F. E. 34
Young, J. W. 35
Hebblethwaite, Dr. A. S. 35
Martine, Dr. W. R. 36
Law, James 36
Redstone, F. J. 36

Proposals for New Industrial Legislation

Clinch, H. G. 63
Lessing, Dr. R. 63
Law, James 65
Monkhouse, Dr. A. C. 66
Prendergast, Counc. Mrs. A. E. 66
Smewin, Counc. E. A. 66
Duffus, Counc. J. 66
Farquharson, G. W. 66
Humphrey, H. A. 67

What of the Future?

Nanson, Ald. J. Talbot 75
White, Dr. C. F. 76
Tylecote, Prof. F. E. 77
Cozens, Ald. E. T. 78
Collier, Dr. W. A. L. 79
Martine, Dr. W. R. 79
Hardern, Leslie 80
Gamlen, R. E. 81
Stewart, Counc. H. 81
Smith, Donald V. H. 81
Williams, A. F. 82
Beaumont, J. W. 83
Grant, David 83

WELLCOME INSTITUTE
LIBRARY
Coll. welMOmec
Call pam
No. WA 750
1946
N27p

MESSAGE FROM THE LORD PRESIDENT OF THE COUNCIL

The Rt. Hon. Herbert Morrison, M.P. :—

I very much regret that press of Parliamentary duties has prevented my being present at the Conference of the National Smoke Abatement Society. The Society is carrying out work of the highest national importance. It is also work in which I am closely interested, as the Minister responsible for the Department of Scientific and Industrial Research, for the Department carries out research on atmospheric pollution.

It has been estimated that atmospheric pollution costs the nation about £50 millions a year. This is a conservative estimate, yet it is a grave figure and moreover it takes no account of the ill-health and dreariness caused by smoke. There are, however, two other aspects which make the solving of this problem imperative.

It has been estimated that the weight of smoke emitted in this country from burning coal is nearly three million tons a year. But that is not the whole of the waste, for smoke is always accompanied by unburnt gases ; and it has been shown by the Fuel Research Station of the Department of Scientific and Industrial Research that, with an industrial boiler chimney emitting black smoke, the loss may be as much as 10 per cent. of the heat of the coal. We cannot afford to waste our precious coal in this way, especially under present conditions. As you know, the success of the Ministry of Fuel and Power's campaign for industrial fuel economy in reducing the emission of sulphur dioxide and smoke by as much as ten per cent. in a single year shows what can be done if we are determined to conquer this menace.

Waste of coal is bad enough, but waste of manpower is even worse. It is waste of manpower in the pits to make such inefficient use of coal. Manpower is also required for cleaning up the mess caused by smoke, and this is no inconsiderable item. So the work of the Society is aimed at conserving our two most precious commodities—coal and manpower—as well as money.

We should have a national drive to make the public smoke-conscious. Smoke in large quantities from industrial chimneys already rouses some feeling of resentment. I want that feeling increased, and aimed not only at the factory chimney but at the ordinary smoking domestic chimney, until public opinion will insist that smoke is anti-social and not to be tolerated.

THE PRESIDENTIAL ADDRESS

by

SIR GEORGE ELLISTON, M.C., M.A., J.P., D.L.

(Chairman of the Public Health Committee, City of London)

It is eight years since the Society last met for a full-scale national conference and I think perhaps as we look ahead to our future activities it may be interesting and helpful to glance back over the road that we have travelled to our present position.

As most of you will know, the story of smoke abatement is at least three centuries old, but there is not time to dwell on the great work of the early pioneers like John Evelyn. I wish to recount more particularly what has taken place within the present century.

When it began, the Coal Smoke Abatement Society, which had been formed to raise a protest against the atmospheric pollution of London, was only one year old. Manchester, whose smoke problem was and is scarcely less acute than that of London, was, for once, a whole decade behind the Metropolis, for it was not until 1909 that the Smoke Abatement League of Great Britain was formed in that city.

In London, the pioneer and driving force was our late President, Dr. des Voeux. As Treasurer of such a crack-brained organization, as it was then deemed to be, he had a more than unenviable uphill task in collecting the necessary meagre funds for administration and propaganda. With a courage which those of us who knew him so often witnessed, he at once descended upon the Mayor of a London borough to expound his gospel, only to be informed that there were places maintained at public expense for people as crazy as he was.

I should like you now to recall the message from the Lord President of the Council that was read to you only a few moments ago, for I think the story I have just told you and that message illustrates perhaps more graphically than volumes of print could do, the distance that our movement has travelled and the change that has taken place in public opinion, due in no small degree to its efforts, for be it remembered that in this country legislation follows and never precedes public opinion.

Meanwhile, in Manchester, the sister body concentrated on the industrial northern counties and very soon joined up with the movement in Scotland. It had as its Secretary Mr. E. D. Simon, now Sir Ernest Simon. Through all those years his interest in the subject has, if anything, intensified and we were delighted when, with a greater wisdom than is sometimes displayed by the powers that be, Sir Ernest was appointed Chairman of the Government's Fuel and Power Advisory Council. I hope by now you are all familiar with the Report on the Domestic Fuel Policy which has come from Sir Ernest's Council and which endorses so much of the Society's own policy. In my opinion this Report is one of the most helpful departmental documents issued during recent years, for it provides an invaluable source of information for everyone concerned with fuel economy and the public health problems of smoke abatement.

The friendly relations which all along existed between the two smoke abatement bodies resulted quite naturally in a marrying of the joint interests in 1929. Obviously the great progress made both in London and Manchester would not have been possible through the individual efforts of the two pioneers I have mentioned, great as they were. The London Secretary was our present Treasurer, Sir Lawrence Chubb, and in Manchester there were men like Will Melland, two names which I feel among many other stalwarts call for special mention in any review of the past work of the Society.

The ten years between the merger and the outbreak of war was a period of intensive effort and of rich results, which are only now becoming fully apparent. The war years halted visible progress but gave us an opportunity for developing bold new policies, some of which have already been adopted by the Government and local government authorities and others which we believe should be adopted at an early date are to be discussed at this Conference.

A Constructive Policy.

I regard this Conference as particularly important in that it will give a new direction and orientation to the Society's activities. We start afresh with the tremendous advantage that some of those things for which we were still battling in 1939 are now established Government policy. The Government is firmly committed to a policy of cleaner air. It would seem therefore, that the main task of the Society is not to dwell as formerly upon the ravages of atmospheric pollution, now universally recognized as a national waste, but the more constructive work as to how this pollution can be diminished most effectively and in the shortest possible time. The Society's policy is no longer a counsel of perfection ; it has now become a matter of urgent necessity on the lowest economic grounds alone. There is little use the Ministry of Fuel and Power and other Ministries lamenting the shortage of coal for every purpose, industrial, domestic and export when we scatter no less than 2½ million tons of it unburnt into the air to cause damage to our buildings and possessions, which with other costs conservative authorities have estimated at two million pounds per week.

Jaded as our minds are these days with all kinds of astronomical statistics, a mere 2½ million tons of coal a year is perhaps not sensational. Nevertheless it represents four days output for every miner in this country, and would be enough to provide an extra four or five hundredweight of fuel to every family during the coming winter. If the heat we lose through smoke and other allied results of wasteful burning could be harnessed to industry, the fuel crisis would be over and Mr. Shinwell's anxieties would vanish for ever more.

The serious manpower shortage is one of the reasons for the coal shortage. Yet, fantastic as it may seem, we are in effect employing ten thousand miners to produce smoke, and a far greater number of other people in clearing up and making good all the damage it does.

Appeal to Local Authorities.

Obviously, then, the most pressing task before the Society is to ensure that this saving of coal and manpower shall be brought about as quickly as possible. Therefore, we are encouraged in that no less a person than the Lord President of the Council himself has indicated the most effective way in which this can be achieved. There are at present affiliated to the Society over two hundred local government authorities, including most of the largest, many of medium size, and some small, so that we have a complete and representative cross-section of municipal thought and opinion with us. But there are more than 1,500 local government authorities in this country and upon them mainly rests the responsibility of educating public opinion in their respective areas, and having educated public opinion, of implementing legislative authority by preventing the production of smoke in their own areas, or if they do not themselves produce it, to prevent its importation from their neighbours.

Smoke knows no boundaries, and few areas in Britain are entirely free from its direct effects, while a substantial part of the smoke bill is paid for by those who live in the cleanest parts as much as by the remainder. The cost of smoke to trade and industry, for instance, is paid for in the long run by the consumer, whether he lives in Sheffield or St. Ives.

So it is imperative that all local authorities should join in the fight against smoke. I would take this opportunity of welcoming to this conference the delegates of those local authorities which are not yet members of the Society, or which are being represented at one of our gatherings for the first time. We hope they will come in and help us. The Society is these days very largely a body composed of local authorities, and it is devoting much of its present limited resources to their service in one way or another. We are anxious to extend these services and to develop new ones, and for the Society to become, as it is in fact fast doing, the central bureau of information and assistance in all aspects of smoke prevention activity. At present, alas, more is demanded of us than we can possibly do, and the surest remedy is for us to have from a far greater number of local authorities the very modest measure of support we seek. I do hope that this appeal may go back to your respective Councils.

As Chairman of the City of London Health Committee, perhaps I may be allowed to mention two steps taken during the past year by the Corporation in the cause of Smoke Abatement. Encouraged by this Society they first considered the creation of smokeless zones within the city but they found the problem was complicated by the smoke output from the great railway stations and from steamships in the port. For the time being therefore they had to be content with securing in a Private Bill, now on the Statute Book, a clause requiring prior approval by the City Health Department of all new fuel-burning installations. That in itself was a considerable achievement, but the Corporation decided to go further and get expert advice on the possibilities of district heating for the extensive areas of the city devastated during the War. On the face of it, it seems an unique opportunity for the piping of heat and hot water to the acres of offices and warehouses which must be rebuilt during the next few years. No previous scheme at home or abroad has dealt with a great commercial centre which has to be re-created *de novo* and where the advantages of district heating are more obvious. The Corporation are now awaiting a report from their expert adviser, and it is hoped that financial and other considerations will justify the adoption of a scheme which would automatically create smokeless zones in large areas of the city.

A Sub-committee of the Building Research Board have recently issued an Interim Memorandum on District Heating* which gives rather cautious encouragement to those local authorities who are considering the supply of heat and hot water to the central areas of large cities and to new housing estates, large and small. Judging by the views expressed at the recent Conference convened by the Ministry of Fuel it seems probable that the final report we now await from the Egerton Committee will approve the promotion by Local authorities of central heating schemes which give due consideration to the complex economic problems involved. Summing up the Fuel Conference discussion Mr. Donald Smith pointed out that all the experts who had contributed, irrespective of differences in systems advocated or examined, had agreed that district heating is practicable in Great Britain, that it should result in a great economy in fuel consumption, and that a higher standard of heating can be obtained with less fuel by means of district heating than by any of the traditional methods in use in Great Britain. No doubt members of this Society, and their guests, to-day well realize the urgency of bringing these facts to the early notice of the Committees who are planning their local housing schemes.

It is no exaggeration to say that the fight against the smoke evil, an evil from which we have suffered for so long, and which for generation after generation has wasted so much of the nation's health and wealth, is now entering its final and decisive stage. The full implementation of all that is contained in the Domestic Fuel Policy Report, the provision of new kinds of legislation and the early establishment of expanding smokeless zones—all these and other policies are practicable, and give well-defined objectives that, when they are won, will mean the virtual end of smoke. It is true that there may be some mopping-up operations, but they will be only of a minor or local character. We can look forward with confidence to great victories in the not-distant future, but, as we all know, it is the final effort that has to be the most intensive. I hope that in the years to come we shall be able to look back, as I have looked back for a moment this afternoon, and see that this conference in Brighton was in fact the beginning, and a worthy beginning, of that last offensive.

---

* Interim Memorandum on District Heating : Department of Scientific and Industrial Research. H.M.S.O., 3d. net.

FIRST SESSION

Friday Morning, 25th October, at 9.30.

SMOKE PREVENTION IN NEW HOUSES

Chairman : **The President, Sir George Elliston**

INTRODUCTION

The Society's views and policy for smoke prevention in new housing have been fully stated on previous occasions, and here they need only be summed up as a demand that all new houses, whether municipally or privately built, should be equipped to facilitate the fullest use of gas and electricity, that the possibilities of district heating should be carefully considered, and that the solid fuel appliances that are installed should be only of the improved types that are suitable for smokeless fuels, even if for the time being some bituminous coal has to be used in them. This policy is consistent with the recommendations of the *Housing Manual, 1944,* which have recently been strongly endorsed by the Fuel and Power Advisory Council in their report *Domestic Fuel Policy.*

It was agreed that it would be of considerable value to secure information on what is being done towards implementing these recommendations in the housing programme now starting, and to discuss the present position at this conference. To secure this information the co-operation was sought of those Regional Committees that have resumed activity, and for Scotland and the East Midlands the assistance of members of the Societey was invited. For areas not so covered the Society itself approached the local authorities. A Questionnaire was prepared, framed in a way that would simplify answering, and this has been used, with slight modifications in some cases, by each of the " Reporters " appointed to circularize the authorities and prepare a report on the replies received.

The questions asked were as follows :

Policy.

Q.1 Has the Authority considered the recommendations of the Housing Manual, 1944, and of the Fuel and Power Advisory Council in their recent report " Domestic Fuel Policy " ?

Q.2. What is being done to facilitate the use of gas and electricity on the lines recommended, by the provision of electric points and gas connections in all rooms where they are likely to be required ?

Q.3 What is being done, or attempted, in installing the new types of multi-fuel open fires, and openable stoves, etc. (i.e., those suitable for both smokeless fuel and bituminous coal) ? (N.B.—The fact is of course recognised that some of these appliances must for the present be smoke-producing because of the unavoidable use of raw coal. The immediate objective is to have the right appliances installed).

Q.4 What decisions have been made with regard to :

(a) Insulation of walls, roofs and hot water systems ?

(b) The provision of fuel stores to contain one to two tons of different solid fuels in separate compartments ?

Q.5 Has any consideration been given to :
(a) District heating or block heating for houses ?
(b) Block heating or central heating for flats ?

Progress.

Q.6 What actual progress is being made on the above lines ?

Q.7 What difficulties, criticisms, or prejuidices are being encountered ?

Q.8 What requires to be done to improve the present situation ?

Private Building.

Q.9 What is the attitude of, and what is being done by, private builders ?

Q.10 Have any steps been taken to induce them to follow the Housing Manual recommendations ?

Completed Installations.

Q.11 Any reports or opinions on improved heating installations already in use, including new types of openable stoves in prefabricated houses, which are in many cases burning coal and creating, because of the low chimney height, an objectionable smoke.

To avoid repetitions in the reports that follow the questions are referred to by their numbers.

It will be seen that in most cases a substantial proportion of the authorities approached responded to the request, and that the replies are therefore a reliable indication of the position as it exists generally at the moment, considered either nationally or regionally.

The Society is grateful to those who have prepared and issued the questionnaires, and analyzed the repiles in the form of the reports that follow.

It is appreciated that a consolidated summary of the reports, and a statement of the general conclusions to be drawn from them, would be of value. At the time of writing, however, all were not available, so that such a summary has had to be deferred until the final printing, when it may be possible also to incorporate observations made verbally during the conference discussion.

SCOTLAND

Copies of the questionnaire were sent to the larger local authorities and the following is a synopsis of their replies :—

Q.1 Although the authorities themselves may not all have considered the recommendations of the *Housing Manual* 1944 and of the Fuel and Power Advisory Council in their recent Report on Domestic Fuel Policy, these appear to have been kept in view by the officers responsible for the planning and erection of new houses.

Q.2 Electric or gas points are being provided in all rooms where they are likely to be required.

Q.3 Whilst a number of local authorities appear to desire to install the new types of fireplaces, these have so far only been installed in the Government temporary houses.

Q.4 (a) Regarding the insulation of walls, roofs and hot-water systems, the practice generally is to have cavity construction of main walls and, except in the case of concrete roofs, to cover roofs with boarding and felt before slating or tiling. Water supply pipes are wrapped.

(b) No separate compartments are provided for fuel storage. Accommodation for half-ton solid fuel is provided as recommended by the Scottish Housing Advisory Committee.

Q.5 (a) In a small number of instances, district heating has been under consideration, including a scheme for several hundred houses at Craigmillar, Edinburgh. A scheme for over 500 houses at the Priesthill Housing Scheme, Glasgow, has been approved by the City Council.

(b) In some instances also, block or central heating for flats has been considered, including a scheme in Glasgow for the provision of hostels for single women, and in multi-storey flats.

Q.6 It cannot be said that much actual progress is being made on the above lines. The traditional heating of buildings and domestic hot-water is still usual, but convection heating of cottages is being introduced. The newer knowledge, however, is receiving more attention and the results of experiments are awaited.

Q.7 The supply of modern appliances is still small and their cost is higher. More encouragement appears to be required by the Government Departments concerned to the local authorities to proceed with either district heating schemes or the installation of the new types of multi-fuel open fires and stoves.

Q.8 It is considered that the present situation can be met only by a more plentiful supply of better grade fuel and by a more adequate supply of fires and stoves suitable for smokeless fuel, as well as direct encouragement from the Government to local authorities. Another suggestion is that propaganda should be presented to the public in a popular or non-technical manner.

Q.10 There is very little private building, but with few exceptions traditional practice is being followed. The additional cost of appliances is stated to be the deciding factor.

Q.11. For the reasons stated, no steps have been taken to induce private builders to follow the *Housing Manual* recommendations.

Q.12 Although in most cases, the new types of openable stoves have not been sufficiently long in service to form an opinion, complaints have been received regarding the need for weekly cleaning of short chimney flues and the blackening of ceilings and surrounding walls. The type of cowl tends to direct smoke downwards. One reply states that the system of conducting warmed air from ducts behind fireplaces to bedrooms does not operate successfully and may be attributed to the position of inlet and outlet ventilation. Another reply advocates cheaper consumption cost of electricity to encourage its use.

Allan W. Ritchie,
President, Scottish Division.

NORTHUMBERLAND AND DURHAM

The Northumberland Durham Advisory Regional Smoke Abatement Committee has not met for several years and there is no Secretary, so I haxe taken on the duties of preparing a report on the heating installation in new houses for this Region.

The following authorities were circularised with a questionnaire drawn up on the lines suggested by Mr. Marsh, of the National Smoke Abatement Society :

County Borough Councils—
Newcastle-upon-Tyne, South Shields, and Sunderland.

Urban District Councils—
Ashington, Bedlingtonshire, Billingham, Blaydon, Chester-le-Street, Felling, Hebburn, Houghton-le-Spring, Longbenton, Newburn, Seaham Harbour, Seghill, Stanley and Washington.

Rural District Councils—
Chester-le-Street, Houghton-le-Spring, and Sunderland.

Northumberland and Durham County Councils were also circularized for information. The circulars were addressed to Medical Officers of Health, although it was realised that as the questionnaire dealt with matters relating to new house construction, the matter was really one for engineers and architects and I have to acknowledge with thanks the information provided by these officers.

Ten Councils replied to the questionnaire as follows :

Q.1 Every Council has replied that the Housing Manual of 1944 has been considered.

Q.2 As to the use of gas and electricity, three Councils have provided electricity only, three have given a choice of gas or electricity and four have provided both gas and electricity.

Q.3 Five Authorities are providing the new multi-fuel open fires of the convector type. Three Councils replied that the scheme was impracticable, as tenants, being miners, received free coal sometimes of a very poor quality. The remaining two Councils replied that one solid fuel burning fire is being placed in each house.

Q.4 (a) As regards insulation of walls, nine Authorities are making provision for insulation of walls, roofs and hot water system and one Authority is making no such provision.

(b) As regards the provision of separate fuel stores, no Authority reports that separate provisions for each type of solid fuel has been provided.

Q.5 (a) As regards district heating all Councils replied that consideration has been given to the question of district heating but no Authority has, as yet, installed it, although one area is introducing block heating into business premises, with flats above, together with the provision of a communal laundry.

(b) As regards block heating or central heating for flats, no Authority has, as yet, introduced this.

Q.6 All Authorities report that progress is bein made on the lines as mentioned above, the difficulty being that until better quality bituminous coal and smokeless fuel is available, little, if any progress will actually be made. One area states that as they are eight hundred feet above sea level, atmospheric pollution is practically nil.

Q.7 Criticism : Throughout the area there is still the conviction that the average person prefers to retain the open coal fire.

Q.8 As to what can be done to improve the present situation, the replies vary between bringing the cost of gas and electricity down and more supplies of the better types of fuel recommended by the Fuel and Power Advisory Council. One Authority goes so far as to state that the main offenders are the collieries.

Q.9 As regards the attitude of the private builders, in areas where there are private builders still carrying on, they seem to follow entirely the practice taken by the local authorities.

Q.10 As regards steps being taken for private builders to follow the Housing Manual, builders generally follow such recommendations, and the conditions under the Housing Manual have, in many cases, been pointed out to the private builders.

Q.11 A two years' experience by one Council with the "Ideal" Neo-fire has proved satisfactory and has influenced the decision to proceed with this type of installation in all new houses. In other areas, the schemes are not yet sufficiently developed for any opinion to be reported. In many areas, the objection which was raised at the last meeting of the Smoke Abatement Society, in connection with smoke pollution due to the low chimneys of prefabricated houses, seems to be substantiated in most areas in the North and the requirements are emphasised that solid smokeless fuels should be used in all prefabricated houses.

From all these replies, it would appear that in the North of England the average person is still sticking to the open coal fire and it is only by intensive propaganda, including practical demonstrations of the new convector type of heating stove, that the average person will realise there are other and even more comfortable methods of heating a house than the open coal fire. Coke does not seem to have been mentioned in any of these replies, although it is a solid smokeless fuel and it can be burnt satisfactorily in an open grate if mixed with coal, or even by itself when first ignited by coal or gas. The time is too short in the post war period of new housing construction to come to any conclusion as to the benefits which may have been obtained from any new heating installations being installed ; the matter should be re-opened after a period of years.

Dr. A. S. Hebblethwaite,
Medical Officer of Health for Sunderland.

NORTH-WEST

In accordance with the request of the National Smoke Abatement Society, enquiries have been instituted from local authorities in the Society's North West Divisional Area, as regards policy and progress with fuel burning installations in new houses.

172 local authorities were approached and definite information was obtained from 16 county boroughs, 28 municipal boroughs, 32 urban districts and 9 rural districts, a total of 85.

The views expressed in each case were those of the officials, not necessarily those of the Council.

Whilst replies were not received from the whole of the local authorities approached, it is considered that the information obtained is representative of the whole position generally in the region, which includes North Wales, Cheshire, Lancashire, Westmoreland and Cumberland.

The basis of the enquiries and a summary showing the information obtained from each local authority is indicated in the appendix to this report.

The general situation indicated by the enquiries is as follows :—

Q.1 With few exceptions the whole of the local authorities have considered the recommendations of the *Housing Manual* and the report entitled " Domestic Fuel Policy."

Q.2 Similarly practically all the authorities are facilitating the use of gas and electricity by the provision of gas connections and electric points in all rooms where they are likely to be required for cookers, washboilers, fires, gas pokers and power.

Q.3 A large number of local authorities have decided to install these appliances in new houses, but over 50% have either arrived at no decision yet or have taken no action.

In one instance it is suggested that some of these appliances have not yet passed the experimental stage and in other cases, cost has been the decisive factor in not installing the appliances.

Q.4 (a) Only about a quarter of the local authorities report that special attention is being given to insulation of roofs principally, by the use of felt.

Many authorities are specifying cavity walls, which in some cases are to be sealed, but in the main there is no special attempt at insulation.

As regards hot water systems in 14 instances the local authorities have decided on wrapping or lagging of pipes, and in 11 other cases it is reported that the system will be sited centrally in the house or short runs of pipe installed.

(b) Whilst some local authorities have decided to build fuel stores with separate compartments to hold different solid fuels, twice as many authorities are providing orthodox single fuel stores.

Q.5 62 local authorities have either not considered this form of heating or have not arrived at a decision.

18 have given the matter consideration, but are not taking any further action.

In only 3 instances are schemes proposed.

Central or block heating of flats is intended in 5 instances only.

Q.6 In over half of the cases there is no real progress to report, pre-war methods being still in use or no decisions having been arrived at as regards modern fuel burning installations.

Modern appliances are being installed in houses in course of erection or to be erected by 39 local authorities.

Q.7 Amongst the difficulties encountered by local authorities, high costs of installations and unsatisfactory supplies take the major place.

In many instances there is either a preference for open fires of the old type or a prejudice against the new types, sometimes on the grounds of appearance.

A number of local authorities report that no decision is yet possible because the houses are not completed and occupied.

Q.8 As might be expected the chief suggestion is improvement in the supply position and reduction in costs.

Other suggestions are for more publicity as regards the appliances concerned, extension of electricity supplies, the use of district heating and the discontinuance of manufacture of old type grates.

Q.9 Whilst many authorities state that no private building is in progress in their districts, a large number say that private builders are still following pre-war methods.

In 3 instances they are following the local authority's methods and in 11 cases they are willing to adopt modern appliances and systems in their building.

Q.10 It is the practice of the majority of local authorities not to draw the attention of private builders specially to the recommendations of the *Housing Manual*.

In one case it is stated that the builders' clients should be educated in this respect because the builder often erects houses according to instructions.

Q.11 Mainly because the local authorities' housing schemes are not sufficiently advanced in many instances no observations are available.

In a few instances the tenants are reported to be satisfied with the appliances installed by the council, whilst in other cases it is stated that there has been insufficient experience on which to base an opinion.

Several local authorities report that low chimneys to openable stoves in prefabricated houses are a disadvantage and are likely to cause objectionable smoke, but actual complaints of smoke are recorded in only 3 instances.

Dr. C. Metcalfe Brown, M.D., D.P.H.,
Barrister - at - Law, Medical Officer of Health, Manchester, and Honorary Secretary, Manchester and District Regional Smoke Abatement Committee.

WEST RIDING OF YORKSHIRE

Copies of the Questionnaire were sent to 47 Constituent Authorities and 25 replies were received. The 25 Authoritites comprised 6 County Boroughs, 3 Municipal Boroughs, 15 Urban District Councils and one Rural District Council.

The following is an analysis of the replies.

Q.1 was answered in the affirmative by all.

Similarly with **Q.2** except where qualified by the remark (in two cases) " reduced in accordance with the requirements of the Ministry of Health " from which it would appear that to reduce cost the Ministry had advised a curtailment of the number of gas or electric points.

As regards **Q.3** one authority had a stock of old pre-war ranges which it desired to exhaust before purchasing new ones ; 19 had either installed multi-fuel ranges mostly of the back-to-back type or ranges capable of burning coke or coal or a mixture of both, while one authority preferred the old type of range because being a mining area the people insisted on burning raw coal. In the remaining 4 cases the matter was still under consideration.

The replies to **Q.4 (a)** respecting the insulation of roofs, walls and hot water systems showed a good deal of variation. In 14 the traditional methods were adhered to, in 10 nothing is being done, while one had not decided what to do.

Q.4 (b). Eight authorities proposed to provide double fuel stores, 16 single fuel stores and one authority failed to answer the question.

Q.5 (a). This was answered in the negative by all except two authorities where it was stated that the matter was still under consideration. The reason adduced by one authority for rejecting district heating was on the ground of expense.

Q.5 (b). This question was answered in the negative by all the authorities except two which said the matter was under consideration. The majority of authorities did not possess flats and had no intention of building flats.

Q.6. Thirteen authorities had a varying number of houses in course of construction in which though not specifically stated one must assume the progress was satisfactory, in three progress was slow owing to the difficulty in obtaining appliances. In two building had not yet commenced and four ignored the question.

Q.7. Where this question was answered, the difficulty most emphasised was shortage or slow delivery of appliances.

Q.8. All authorities agree that what is most desirable is the speeding up of the delivery of appliances. Two authorities point out the need for better supplies of smokeless fuel at cheaper rates whilst two suggest that steps should be taken to educate the public in the use of smokeless fuel.

Q.9 and Q.10. These questions were answered by very few authorities, most of them saying that little or no private building is going on and such as is, is being undertaken on very much the same lines as before the war. One or two point out that the private builder is having to face the same difficulty with regard to appliances as the public authorities and frequently in the absence of modern appliances is compelled to fit old-fashioned types of grates.

Q.11. Of the 9 authorities who answered this question 6 had no complaints, one complained that the fire bars burnt out too quickly owing to the use of the wrong type of fuel, another that the amount of smoke emitted was excessive due to the burning of raw coal. One authority explained that it had experimented with a coke-burning Lefray fire adapted to a back-to-back range and fitted with hopper feed. The results had been satisfactory and this type was being installed in 300 houses. All answers related to prefabricated houses.

Comments.

The general impression gathered from the answers is that most of the Local Authorities are interested in the prevention of smoke and the installation of smokeless heating appliances. The difficulty they are up against and of which they complain is the lack of these appliances, slowness of delivery and restriction of choice. Many are being forced to install old-fashioned grates because of this lack. It is imperative, therefore, that something should be done to speed up the manufacture and rate of delivery of solid fuel burning grates designed to burn coke or other types of smokeless fuel. The supply position also requires some attention. at the moment supplies are extremely limited and the fuel is very expensive, indeed, in some cases more expensive than the best household coal. Until the price of coke can be reduced it is useless to try to pursuade householders to abandon coal.

The need for two fuel stores is questioned on ground of expense and one wonders whether two stores are actually necessary. A divided fuel store of adequate size would certainly go a long way to meet the difficulty but the best and most satisfactory way would undoubtedly be the use of one kind of fuel. If, as one authority states, it is possible to fix a hopper feed using coke to a back-to-back range, that would be of undoubted value to the housewife who would thereby be relieved of the constant stoking which is necessary with a coke fire if it is to be kept alive and bright.

The suggestion that an education campaign to popularize the use of smokeless fuel should be undertaken is good and should receive serious consideration.

J. Johnstone Jervis,
Honorary Secretary.
Regional Smoke Abatement Committee.
West Riding of Yorkshire

SHEFFIELD, ROTHERHAM AND DISTRICT

The Questionnaire was submitted to the constituent authorities of the Sheffield, Rotherham and District Smoke Abatement, from the replies of whom the following report is compiled :

Q.1 The answer in each case is " Yes."

Q.2 In Sheffield provision is being made for gas cookers, either incorporated in the back-to-back stoves or as a separate unit. Electric points are being provided in living rooms and in all bedrooms for radiators. In Rotherham gas connections and electric points are provided in all houses now being erected by the Council. In private buildings increased gas connections are now being fixed. Rotherham R.D.C. reports electric points and gas connections in all rooms where they are likely to be needed ; in Rawmarsh U.D.C. houses at present being built have gas fires on both floors as well as coal fires ; and in Stocksbridge U.D.C. a fixed gas fire is provided in the living room and gas cooker in the working kitchen, with 15 amp. plugs in 4 rooms.

Q.3 Sheffield reports : Some of the new types of houses could have openable stoves but no particulars have yet been received from any manufacturers of a stove of this type at a price to compare with the open fire and back-boiler. Rotherham states that multi-fuel open fires and openable stoves are in very short supply. In Rotherham R.D. some of the new types of multi-fuel open fires will be provided when production is increased, but there is little hope of installing them in houses at present on hand. In Rawmarsh U.D.C. no multi-fuel open fires are being installed in houses now being erected, but Hattersley's independent boilers heat the domestic water circulation, cooking being done by gas. Stocksbridge state that the new types of fire were not available when the specification was being prepared.

Q.4 Sheffield : (a) Walls are of the 11in. cavity type and hollow blocks are used for partitions. Roofs are insulated by roofing felts; hot water pipes and cylinders insulated where necessary; (b) Coal places are provided of the size recommended in the

Rotherham: No decisions have yet been made with regard to the insulation of walls, roofs and hot water systems and the provision of fuel stores for different kinds of solid fuels.

Rotherham R.D.: (a) The usual provisions are being made for insulation; (b) A 4ft. 6in. square fuel store to take the standard fuel box with two compartments in being provided in all future plans.

Rawmarsh U.D.: (a) Walls, nil; roofs lined with roofing felt; hot water system not insulated; (b) Fuel stores to hold more than 1 ton, but not in different compartments.

Stocksbridge U.D.: (a) Cavity walls are unventilated—ground floors are solid. Will provide slag or glass wool to ceilings as soon as price permits; (b) No—but outside "stove" can be used.

Q.5 Sheffield has considered a scheme for District Heating for the Parson Cross extension, but owing to the contours of the ground it would be too expensive and the Heating Engineers could not recommend it. In the other authorities District and Block heating systems are considered not to be applicable, and flats are not being erected.

Q.6 and Q.7 Little information is given under these questions, other than that indicated in the answers to previous questions.

Q.8 The reply from Sheffield states that while the new recommendations are no doubt an improvement, their present high cost is preventing their being more extensively used. Rotherham R.D. anticipates improvements in the delivery of material, and the following comment is made by Rawmarsh U.D.:

> No houses are yet occupied. The district contains three collieries, and it is therefore likely that many of our new houses will be occupied by mineworkers receiving "home coals." It remains to be heard what their reaction will be on occupying a house where all cooking is done by gas and there is but one coal-burning fireplace.

Q.10 and Q.11. Sheffield cannot say what is being done by private builders, and the reply from Rotherham R.D. is similar. In Stocksbridge private building is on pre-war lines, and in Rawmarsh only two pairs of houses are being built by private enterprise.

Q.12 The only comments on the question are from Sheffield, where it is stated that it is too early to give a definite opinion on the stoves in the temporary houses, but it is understood that the Ministry of Works have had to make quite a number of replacements of firebars. This may be due to the tenants not using the stoves properly. The reply from Stocksbridge states that as far as can be checked, the cost of installing central heating with the addition of cooking and topping-up heat is about £29 per house more than pre-war normal fittings.

James Law,
Chief Smoke Inspector.

WEST MIDLANDS

Acting upon the instruction of the Executive Committee of the Midlands Joint Advisory Council for the Abatement of Smoke and Atmospheric Pollution, I sent out that Committee's modification of the National Society's Questionnaire to the Clerks of 114 Local Authorities. Sixty-four replies were received, coming from three County Councils, 9 County Boroughs, 20 Municipal Boroughs, 17 Urban Districts, 14 Rural Districts, with 1 unstated.

The modifications to the suggested questionnaire were as follows :

(1) Question 2. Add—"and what means of permanent ventilation, i.e., chimney or grating, is available where electric power points or gas connections are provided."

(2) Question 4(b). Amend to read—"the provision of fuel stores to contain different solid fuels in separate compartments."

(3) Question 8. Add—"bearing in mind Ministry of Health Supplement to Circular 76/46."

(4) Questions 9 and 10. Combined as Question 9.

In correlating the replies received from Local Authorities I find that :

Q.1 88% have considered the Housing Manual, 12% have not. No reply has been received in respect of the "Domestic Fuel Policy" report of the Fuel and Power Advisory Council.

Q.2 66% are providing both gas and electricity supplies and 27% electricity without gas. Gas is being supplied for cooking and The use of gas pokers, while electricity is being introduced mainly for heating, power and light. Permanent ventilation is provided by air bricks, louvred ventilators, etc., where chimneys are not provided.

Q.3 56% are installing the new type of grate, while 41% are fitting the old and 3% are all electric. The new grates include Siesta, Fulham, Eagle and Esse.

Q.4 (a) 57% cavity walls.

36% felted roofs, 33% normal pre-war construction. One Local Authority is employing breeze slabs under slates or tiles for insulation.

55% lagging hot water system. Two Local Authorities report that their hot water systems are so designed as to prevent heat loss by siting in the centre of houses.

(b) 23%—two compartments for fuel.

77%—one compartment only, of which one fifth are large enough to allow of partitioning.

Q.5 (a) 81% have not considered District heating. Of the remaining 19% who have, only two Local Authorities have decided to proceed with schemes, while one Local Authority plans to do so at a later date. The remainder are still undecided or have decided against this method on the grounds that it is unsuitable by reason of—

(i) the type of Local Authority concerned ;
(ii) difficulties over metering charges ; or
(iii) general cost of such an installation.

(b) Only six Local Authorities have considered block or central heating for flats.

Q.6 63% of Local Authorities have started building on the above lines.

Q.7

(i) Shortage of supply grates, smokeless fuels, materials and labour.
(ii) Prejudice in favour of open fire.
(iii) Free coal issues in the mining areas.
(iv) Cost of more modern grates and smokeless fuels.
(v) Cost of electricity or gas as compared with coal in rural areas.

Q.8 70% express no opinion. Of those who comment, some stress the need for more and cheaper smokeless fuel, with greater ease of delivery to the consumer. Others plead undue delay in supply in the more modern type of grate, pointing out that the grate which is available quickly—usually the old one—will inevitably go in. One Authority notes the faulty handling of new types of grate and the use of fuels for which they were not designed, and considers that there is real need for education of the individual householder as to the advantages of modern grates burning smokeless fuels. Another asks that the provision of electricity be generally extended to all rural districts.

Q.9/10 25-30% of private builders are co-operating to some extent, but in a number of the remainder, licence to build is meantime suspended or no building is in hand. The controlled cost of private building effectively cuts out all extras, thus the cheaper, i.e., old fashioned, type of grate goes in.

The Local Authorities go the length of suggesting that the private builder is not interested unless he happens to be under the control of and building on behalf of a Local Authority.

One Local Authority thinks that builders have a genuine grievance over the cost of the electric wiring required in the provision of all the electric power points demanded.

Q.11 70% expressed no opinion, but where replies were given these included one or more of the following comments :

(i) There has only been one summer since prefabricated houses with modern appliances came into use, thus it is too early as yet to assess what improvement has resulted.

(ii) The chimney of prefabricated houses is too low, and the cowl fitted is unsuitable ; the chimney should be raised to prevent smoke hanging about.

(iii) The wrong fuel—i.e., bituminous coal—is in general use and heating by ducts in prefabricated houses is considered to be non-existent.

(iv) Where coke offered to the householder, it frequently has to be collected by the householder himself.

(v) Dampers intended to keep fire going overnight are seldom used, with no saving in labour or cost to the housewife, or lessening of smoke production.

(vi) Miners get an allowance of coal and will not burn anything else.

(vii) Through the combined effects of the density of prefabricated houses per acre, the low chimney and the use of wrong fuel, atmospheric pollution is undoubtedly being increased.

W. R. Martine, O.B.E., M.D., D.P.H.

(*Hon. Secretary, Midlands Joint Advisory Council*).

EAST MIDLANDS

The questionnaire was sent out to twenty-seven Local Authorities in the East Midlands Area during the month of July and I regret to say that only twelve replies had been received at the time of preparation of this report in September Three " Local Authority Members " of the Society failed to reply to the questionnaire.

A summary of the replies is given below :

Q.1 All twelve local authorities have considered the recommendations of the *Housing Manual, 1944,* but in one instance the authority has not considered the Fuel and Power Advisory Council's report *Domestic Fuel Policy.*

Q.2 All the replies indicate that provision is being made for electric points or gas connections in all rooms where they are likely to be required. Facilities for cooking and the space heating of bedrooms will be by gas or electricity. In one case immersion heater points are being provided to the hot water supply and in another electric **fires** are being fixed in bedrooms. One authority refers to the saving which results from the provision of electric fires and the consequent omission of flues to carry off fumes.

Q.3 Most authorities desire to fix the new types of multi-fuel open fires and openable stoves, etc., but some appear unable to do so because they are not readily obtainable. In only one case does it appear that no special equipment is being provided. One local authority refers to the fact that such stoves and fireplaces are not popular in a colliery district. The supply position appears to be the dominant factor in many cases.

Q.4 Cavity walls are being provided externally by nine local authorities and roof felting is being fixed under the tiles by six authorities. In three instances the maximum allowable prices for new houses do not permit such requirements being incorporated. In only two cases are hot water cylinders being "lagged" and two-compartment fuel stores provided.

Q.5 Generally, district heating or block heating for houses has not been adopted but several authorities are watching developments in this connection. One authority is, however, considering a scheme of block heating in connection with a proposed group of old people's dwellings. In no case is it thought likely that blocks of flats will be erected and, therefore, the question of block heating or central heating has not arisen.

Q.6 Nine local authorities have incorporated the recommendations as to heating arrangements in schemes now in hand but only so far as the supply position allows. Several authorities also refer to the impossibility of complying in full with the recommendations because of the limitation in the cost of houses laid down by the Government.

Q.7 Difficulties, criticisms or prejudices are :

(a) Openable stoves, etc., are not popular with the general public and councillors in two areas.
(b) The cost has prevented three authorities from installing suitable appliances.
(c) In mining areas where many citizens receive an allowance of soft coal, there is a prejudice against openable stoves, etc.
(d) The main difficulty appears to be the supply position.

Q.8 Steps to improve the present position appear to be :

(a) Improvement in supplies of suitable appliances.
(b) Improvement in supplies of smokeless fuel.
(c) The provision of appliances at a reasonable cost.
(d) The education of the public in the advantages of smokeless air and in the use of modern appliances.

Q.9 The attitude of private builders appears to vary considerably. In many areas, little is being done in installing modern appliances in houses erected privately, the reasons given being high costs and the popularity of the open coal fire. There is, however, according to the replies received, a tendency for private builders to favour the proposals as to modern firegrates and stoves and in one case it is pointed out that less solid fuel heaters are now being installed than formerly.

Q.10. Under the small builders' scheme for the erection of houses for local authorities, private builders become acquainted with the recommendations but there appears to be no general movement to induce private builders to follow the recommendations.

Q.11 It appears too early to make any full report on completed installations, but from the replies received, it appears that the openable stoves in prefabricated houses are proving satisfactory where they are used properly and where smokeless fuel is burnt. Many replies, however, state that supplies of suitable fuel are not available and that the tenants in many cases prefer an open fire so that the doors of the stoves are often kept in the open position with the consequent loss of efficiency.

A. Wade,

Chief Sanitary Inspector, Nottingham.

BRISTOL AND DISTRICT

In accordance with the request made by the Executive Committee of the Bristol and District Regional Smoke Abatement Committee, I have circularised all Local Authorities on the lines suggested by the National Smoke Abatement Society in their letter of June last to Mr. F. J. Redstone (Hon. Secretary). Nineteen questionnaires were sent out, fifteen were returned. (2 from County Boroughs, 7 from Urban Districts, 6 from Rural Districts).

The following summarizes the answers given to the questions put.

Q.1 Generally the answer is " Yes."

Q.2 In the newly erected houses in the Boroughs and Urban areas both gas and electricity installations are general, and where such services are available, in Rural Areas also.

Q.3 The installation of opening stove fires capable of burning anthracite fuel is a stock feature in construction of temporary houses. Little progress appears to have been made in the provision of new-type grates because they are not in adequate supply at the moment, but a number of Authorities have apparently considered the matter. An interesting point is raised by a coal producing area which states that there is little prospect of alteration to smokeless fuel unless it is produced locally !

Q.5 The City of Bristol Housing Committee has called for a Specialist's report but no decision has been reached. (This is the only Authority where the question has been answered).

Q.7 Generally the answer is " No." One Authority complains of inability to sweep flues (of openable fires) if bituminous coal is burned. (Reporter's note—Have they considered possibilities of sweeping the flue from top to bottom, i.e., at chimney level, in bungalow-type erections. This is practicable from the writer's own experience).

Q.9 Most Authorities have little or no private building at the present time. Others report no information. It can be taken that where private building has been allowed, grates of traditional design have been installed.

Q.11 Application of this question is not general. Bristol has received a few complaints of domestic smoke arising from temporary houses. In Kingswood the Fuel Overseer made arrangements for supply of "Phurnod" anthracite fuel for all temporary houses (50). Other areas report no complaint or insufficient data upon which to give an answer. These apply mainly to industrial areas, but also include part of Rural Areas contiguous thereto. Grit nuisance arises in one area from use of pulverised fuel at an Electricity Generating Station, and in others from Gas Works. The low grade fuel supplied for industrial use is criticised. Oil fuel plant has given rise to complaints in one area, which also has a special problem arising from burning leather. Bristol, with its large industrial development, obviously has problems which are inapplicable to other constituent Authorities, but the Inspectorial Staff are dealing with any nuisance as and when it arises.

Geo. E. Curtis, F.S.I.A.,
Senior Health Inspector (Kingswood Urban).

GREATER LONDON

The Executive Committee of the Greater London Advisory Council for Smoke Abatement decided to co-operate with the National Smoke Abatement Society in obtaining information regarding the fuel-burning apparatus being installed in new houses. 96 local authorities were accordingly invited to provide answers to a questionnaire dealing with this matter. 48 authorities completed the questionnaire and the replies may be summarized as follows :

Q.1 46 local authorities said that both of the documents had been considered ; one authority still has them under consideration, and one did not give a direct answer, though it would appear from its other answers that the documents have been favourably considered.

Q.2 43 local authorities are providing for both gas and electricity ; 4 for electricity only ; and one is providing central heating using oil-fuelled boilers with automatic control.

Q.3 13 local authorities are providing multi-fuel open fires ; 6 are providing fires for coke burning only ; 4 are providing grates for smokeless fuel only ; and 2 are considering the question of multi-fuel open fires. 3 authorities are not installing multi-fuel open fires because they are unobtainable but will do so when they can get them ; 2 authorities merely say that multi-fuel fires are unobtainable ; 8 are providing multi-fuel and ordinary open fires ; 1 is providing central heating only ; 6 are providing ordinary open fires (in one case because they cannot obtain multi-fuel fires). One local authority is trying to introduce openable stoves, another is doing nothing about it, and a third is using any type of stove available.

Q.4 (a) 29 local authorities are arranging to insulate walls, roofs, and hot water systems ; 3 walls and roofs ; 4 walls only ; 1 floors, roofs and hot water systems ; 1 walls and hot water systems ; 1 roofs only ; 2 hot water systems only. One is doing as much as possible, consistent with capital cost ; 1 is arranging to insulate as is " traditional " ; 1 has the matter under consideration ; 1 is doing nothing about it ; and 3 did not answer the question.

(b) 12 local authorities are providing separate fuel stores (one ton each) ; 9 providing one fuel store ; 12 a " reasonably adequate " fuel store ; 5 are providing 2 separate fuel stores of one-half ton each ; 1 is providing a small fuel store but is also setting up a bulk fuel store to serve the estate. 2 do not require to provide a fuel store (central heating) ; 1 has the matter under consideration ; 2 are not providing fuel stores ; 3 answered the question in an uncertain manner, and one did not answer it at all.

Q.5 (a) 30 authorities have not considered district heating ; one said it was impracticable, and another that it had been considered but not proceeded with because the Ministry of Health thought it would cause unjustifiable delay. 5 authorities said the matter had been considered ; 2 had considered it but not approved ; and 3 had considered it but found that the housing scheme was too small for it to run economically. 2 authorities will consider it in future schemes ; 1 authority is not erecting houses ; another considered it but could not obtain sufficient data to warrant its introduction ; one that the capital cost was too expensive, and one did not give a clear answer.

(b) 19 authorities had not given consideration to this matter ; 13 had given it consideration ; 4 had considered it but found their housing scheme too small. 1 authority had considered it but rejected it on the advice of the Ministry of Health ; 1 thought it was not applicable to their housing scheme ; 1 considered it but found it to be undesirable for the type of flats now contemplated ; 3 were considering it but were still undecided ; 1 had not yet dealt with its Flats scheme ; 1 thought the capital cost too expensive ; 2 did not propose to erect flats, and 2 did not answer.

Q.6 It is difficult to summarize the various answers to this question—the answer to questions 1 to 5 inclusive, above, will enable one to form some idea of the progress made. In some cases the actual schemes embodying the proposals are in course of construction ; some are awaiting approval of tenders ; whilst others said that progress was slow, owing to delay in delivery of stoves. One authority is working on its pre-war arrangements to avoid delay, though some of the modern ideas will be incorporated in its real post-war construction plan.

Q.7 14 authorities have met no difficulties, criticisms, or prejudices ; 8 require more time before these can be assessed ; 8 find the supply of materials the chief difficulty ; 2 said that tenants require a coal fire in the living room and will not consider any other form of heating for this room. Two authorities said that the houses have not yet been occupied ; and one said that the supply situation, together with the cost, often causes the scheme to be reduced, leaving only essentials to be included. One refers to the difficulty met by tenants in lighting smokeless solid fuels and also the high cost of electric heating. One said that it lacks detailed information regarding District Heating, particularly as to its cost. 11 authorities did not answer the question.

Q.8 13 local authorities consider that the supplies of appliances should be very much increased ; 5 think it is too early to pass comment ; 3 are of the opinion that the general public should be educated to smokeless fuel ideas by exhibitions and demonstrations. One authority considers that the price of electricity should be reduced ; 1 would like to be assured that the supply of smokeless fuel will be maintained ; 1 favours the control of licenses to manufacturers of obsolete appliances ; 1 said that the cost generally should be reduced ; 1 thought there should be recognition of the extra cost ; 1 said, as regards District Heating, that the views of the Minister of Health should be obtained—it also thought that this subject was receiving the consideration of the Department of Scientific and Industrial Research and that the report of that body was not yet available. One authority regards the present action for the elimination of domestic smoke as satisfactory ; 18 authorities did not answer the question, and two consider that no action is necessary.

Q.9 In 12 areas the "traditional" methods are being employed, and in one they are being employed because of the lack of experience as to how the general public will react to other types. In 11 areas there is no private building. One local authority said it could not interfere with what private builders do about it ; in 2 areas the builders are not informed and therefore do nothing ; in 2 private builders are adopting the recommendations ; in one they are indifferent. In six areas private builders co-operate within limits of costs. 10 authorities did not answer and one is not concerned with the activities of private builders.

Q.10 8 authorities have taken such steps ; 19 have taken no steps in this matter ; 1 said it had no power to do so ; 1 has no private builders ; 1 said it was not concerned with private builders. 18 local authorities did not answer.

Q.11 23 local authorities have not evidence that this occurs ; 3 say that it does occur ; 5 have no prefabricated houses occupied yet ; and 17 did not answer.

Clifford Ratcliff,
Hon. Secretary,
Greater London Advisory Council for Smoke Abatement.

OTHER AREAS

(Compiled by the Society)

After requesting the Regional Smoke Abatement Committees and two of the Society's Divisions to send out the Housing questionnaire to the local authorities in their areas, it was seen that a number of districts were not covered, particularly in the south-east, south-west, and to a smaller extent in parts of the east and north-east. Accordingly 200 questionnaires were sent to the more important authorities in these areas by the Society itself, and the following report is based on the 80 replies received.

Q.1 All but two of the authorities state that the *Housing Manual* and *Domestic Fuel Policy* report recommendations have been considered.

Q.2 5 out of every 7 authorities appear to be making adequate provision for the use of gas and electricity, largely providing for a choice. One mentions the convection heating of bedrooms by electricity, 4 the provision of electric immersion heaters, 6 of points for gas pokers. Several refer to limitations due to cost controls, and two state that because of this they had had to reduce the provisions that had been planned. One authority admirably itemizes its plans as follows :

Gas and Electric points in kitchen.
Gas ignited coke grate witth back boiler in dining room.
Gas ignited coke grate without boiler in living room.
Electric points in dining and living rooms.
Convection heat and electric points in bedrooms.
Electric immersion heater in cylinder.

Q.3 From the smoke prevention point of view this is the key question. Nearly one-half of the replies are either vague or more definitely not satisfactory, but over one-half—46 out of 80—appear to be taking some action on the right lines, although in some cases the reference may be to equipment for temporary houses only. 15 specifically state that domestic boilers will be installed. 9 complain of the difficulties of supply, and 5 only cite cost as a deterrent.

Q.4 Roof insulation be felting appears to be common practice in the new houses, but there is little reference to wall insulation, except insofar as it is provided by cavity construction. One-third of the replies show that insulation is not being considered, in some cases because of cost. About one-half are jacketing hot water cylinders, and a smaller number are lagging hot-water pipes. A few are placing the hot water cylinder in a close-fitting insulated cupboard.

As regards fuel storage the answers are rather vague and not very satisfactory. About one-third are providing storage for two fuels, and a similar number refer to reasonable accommodation that will in some cases allow for division into two compartments.

Q.5 About one-quarter of the local authorities replying appear to have given some consideration to district heating. In some cases the matter has not yet been decided; in others it has been turned down for various reasons, including : first cost, smallness of housing estates, delay that would be met in completing schemes, lack of authoritative Government lead, and danger of subsidence in a hilly mining district.

About one-half are building flats, and of these a dozen are considering, or have decided upon, the incorporation of some form of central heating, or central hot-water supply.

Q.6 Little concrete information can be gleaned from this question. Progress is said to vary between "very satisfactory" and "good" to "slow" and "very little." Many of the answers refer only to the number of houses now under construction.

Q.7 This question has proved to be ambiguous. In some cases the answers have referred to the difficulties of the local authority ; in others to criticisms by users. Of the difficulties in installation, 11 authorities mention supply, and 13 cost. One-half enter the word "none" as the overall answer, but this is assumed to refer particularly to criticisms by users. Three cases are reported of openable stoves being criticized on account of high fuel consumption. This can have been caused only by lack of understanding of the means for control. Conservatism and some public favour for traditional methods are mentioned in two cases ; that tenants are not familiar with smokeless fuel in one ; lack of smokeless fuel in another, and in another the "improbability of the availability of smokeless fuel in sufficient quantities to allow the installation of appropriate appliances." Lack of cost data on district heating is mentioned in one case, and another cites a general tendency to favour gas and electricity for space heating and cooking.

Q.8 The replies include 26 references to the need for improving the supply of improved appliances ; 9 to price reduction ; 6 to improvement in fuel supply ; 4 to cheaper fuel ; 5 to the need for better publicity on the use and advantages of the new appliances in order to overcome initial prejudices, etc. 5 replies urge less regard for first cost, or an increase in the maximum cost per house permitted. 2 replies desire a Government lead on district heating.

Q.9 On what private builders are doing most replies give no concrete evidence, either owing to lack of information or to the fact that there is little or no private building in progress. Of the replies that do give an indication of the attitude of private builders, 27 show little or no change from pre-war practice, with such references as " conservatism," " insistence on open fires burning bituminous coal," etc. Only 6 replies suggest a favourable, or co-operative attitude in respect of the new methods.

Q.10 Almost half the replies show that steps have been taken to induce private builders to follow the recommendations of the *Housing Manual.* A rather smaller number have not yet done so. One reply states : " No need for inducements. When modern appliances become available they will be used by private builders in preference to the old." One authority states that no licences will be issued unless private builders follow the *Housing Manual* ; but in another case it is said that " the Council have no control over private specifications."

Q.11 54 replies have nothing to report on opinions of appliances already in use. The remainder refer mainly, if not entirely, to installations in temporary houses. Of these 11 indicate satisfaction with the new appliances, and 3 say there are no complaints. A few complaints of high fuel consumption have already been mentioned, and in another case the verdict of tenants is said to be " not too favourable."

Smoke emission nuisances from temporary bungalows are referred to in 4 cases, and " no complaints " on this score are mentioned in 6 cases.

DISCUSSION

Arnold Marsh (National Smoke Abatement Society) opened the discussion by giving a general review of the reports submitted. In general the replies showed a fairly satisfactory awareness of the new standards of domestic heating installations and of the recommendations of the Housing Manual and the Domestic Fuel Policy report, even though the details revealed many difficulties and doubts, and some failures that might in part be attributed to the temporary problems of supply and concern about costs. Provision for the use of gas and electricity appeared usually to be adequate. The installation of the new multi-fuel fires and stoves, or the intention to install them when they are more readily available, was perhaps more general than might have been expected, although the proportion of authorities indifferent to this primary requisite for future smokelessness indicated that further efforts must be made to ensure the universal adoption of the appliances. The position with respect to the important fuel-saving factor of insulation was disappointing, although in many cases failure to employ effective constructional measures was no doubt due, unfortunately, to the need to restrict building costs. Similarly, much more could have been hoped for in the provision of two-compartment fuel stores. Provision for two fuels would be particularly useful during the transitional coal to smokeless fuel period, even in houses with only one fuel-burning appliance. District heating was being considered fairly widely, but so far few decisions to proceed with schemes were reported. There appeared to be a substantial demand for information about details and costs and for a lead from the Government. The attitude of private builders towards the new methods appeared to be very variable. On the one hand some interest was reported, but on the other there was a decided impression of " traditional " methods being used. It appeared that many local authorities were either unable or unwilling to interfere with private practice. It was clear that the position would require close consideration by the Government departments responsible for the implementation of the Simon Report. The existence of objectionable smoke emission from the low-level chimneys of temporary houses was confirmed from a number of quarters. This was due to the use of bituminous coal in openable stoves where smokeless fuels should always be used. The trouble was no doubt due in part to difficulties in obtaining smokeless fuel, and there should be a special effort to secure it for the temporary houses. Education in the best use of the new appliances was probably a further factor of importance. As several reports mentioned, the difficulty was particularly serious in areas where temporary houses were occupied by miners, who received a relatively generous quantity of coal as a wage in kind. Here, of course, smokeless fuel was not wanted. This raised the general problem of the miner's home coal, which would require much careful—and understanding—thought. In conclusion, the reports were of considerable interest, both for the information they gave and that they did not give, and in the trends, rather than the achievements, they revealed. They reflected the difficulties of the present transitional stage, and it was probable that another questionnaire in a year or so, perhaps modified and improved, would show more clearly the actual progress that was being made towards applying the new standards of domestic heating and smoke prevention. Mr. Marsh continued by giving a brief report of important statements made at the recent "Fuel and the Future" conference of the Ministry of Fuel and Power. Sir Guy Nott-Bower, Joint Deputy Secretary of the Ministry had stated that the Ministries of Health, Fuel and Power and Works had accepted the Simon Report. An Interdepartmental Committee on Domestic Heating, with Sir Guy as Chairman, had been set up, representing the above Ministries and the Ministry of Supply. This had been divided into sub-committees. The two principal difficulties, Sir Guy had said, were the shortage of coal and the shortage of appliances for the immediate programme. A preliminary list of approved appliances had been prepared and the Ministry of Supply had placed "blanket" orders. A speed-up to reduce the shortage of foundry workers was being made. The replacement of appliances in existing houses would be considered. With regard to fuel, Sir Guy had said that the supply of smokeless fuel would be in the forefront of the programme of the National Coal Board. The South Wales coalfield was that in greatest need of reorganization, and an increasing supply of smokeless fuel from that area was to be expected. Sir Guy urged local authorities not to hesitate to put in new appliances. They were of the non-selective type, in which it was possible to burn bituminous coal as well as smokeless fuel. Alderman Charles Key, M.P., Parliamentary Secretary to the Ministry of Health had said that the Ministry would do all in their power to urge local authorities to install such improved appliances as had been fully tested and approved by the Government. They would only recommend appliances they were satisfied local authorities could afford. "Let me make it quite clear," Alderman Key had continued, "that much as we are concerned to keep housing costs down, we would not dream of cutting out an approved appliance from a local authority's plans merely on account of additional cost."

D. Cleave Cross (Institution of Gas Engineers) said that arising from a study of the regional reports based on replies to questionnaires submitted to Local Authorities, he wished to focus the attention of delegates upon four points :

(1) There appeared to be either a serious lack of appreciation or complete apathy of a large number of local authorities of the urgent national need for the prevention of the serious nuisance and ill effects of smoke. It could not be denied that it would be far more profitable for the country in every way, if the Ministry of Health were to plan to spend money more liberally in providing for clearer atmosphere and less smoke in the manner stated below, rather than have to spend the millions of pounds per annum as contemplated in their health service scheme for the curing or alleviation of pain and disease brought about by the existing unhealthy atmosphere of our towns and cities, and lack of sun due to smoke.

(a) Specifying that only approved smokeless burning appliances should be installed in domestic houses, and only smokeless fuel used.

(b) That all bedrooms should be provided with a chimney for adequate ventilation and removal of products of combustion from any form of smokeless burning fuel used for heating.

(c) Adequte insulation of roofs, walls and floors of buildings to conserve heat, and save waste of fuel.

(2) The second point upon which the attention of delegates was drawn arose from the pressing need for the utmost economy in the use of solid fuel. It was essential that only the correct grade and size of solid smokeless fuel which would burn with the greatest efficiency and least amount of waste, should be used in a domestic appliance. It was an accepted fact that the size fuel required to give the most efficient results in an open fire, was unsuitable for a small closed domestic boiler and vice versa. If the wrong fuel was used, then there was a loss of efficiency and waste. Therefore, it was essential to provide the householder with at least two compartments for the storage of fuel.

(3) It was suggested that the use of unsuitable and the wrong grade of coke in a domestic appliance was probably the chief cause of complaints sometimes made by delegates at conferences against the satisfactory performance of smokeless fuels. It was desirable to educate and encourage the householder to use the correct grade and size of fuel, then smokeless fuels would become more popular and it would lead to less smoke polluting the atmosphere.

(4) The last point raised was the short-sighted policy of local authorities in fitting up houses "all-electric" with no other form of energy for heating or cooking. The daily newspapers were continually warning the public that the electric grid system was overloaded, and it was periodically necessary to cut off supplies. Then why fit houses with only this one overloaded source of fuel? It was suggested that all houses should be provided with at least two different forms of fuel, such as electricity and gas and better still, the addition of a smokeless solid fuel appliance, so that the householder was not solely dependent upon one fuel, but had an alternative source of energy, should one of the above fail.

W. Beaumont (Coventry) said that the replanning and reconstruction of the bombed towns and cities, together with the enormous programme of housing with which the country was now faced, presented the greatest opportunity of our time for introducing into new houses smokeless grates and fuels, thereby greatly reducing atmospheric pollution from this source. With respect to Coventry, the city he represented, the housing problem had reached very serious dimensions. The waiting list for houses amounted to 15,000 and the city stood in need of 24,000 dwellings. The situation was being met by the Housing Committee with great energy and determination in spite of labour difficulties. Since the end of the war Coventry had built more houses in proportion to size than any other authority save one and had rehoused over 2,200 families. The actual number of houses of all classes completed up to date was 2,483. This number included 1,000 prefabricated bungalows erected or in course of erection on five housing estates. The bungalows were of the following types: Arkon, 491; U.S.A., 307; Phoenix, 50; Aluminium, 152. All these four types were provided with "Siesta" or similar types of openable grates, together with a gas or electric cooker. The occupiers were very impressed with the efficiency of this type of grate, both from the point of view of space heating and water heating. Although these openable stoves were intended only for the use of coke, it was the experience of the occupiers that a quantity of small coal was necessary to start a fire, with the result that in the early morning smoke was emitted in fairly large quantities, causing more or less a pall of smoke at a low level, about twelve or fourteen feet from the ground, which hung about around the dwellings unless there was a sufficient air movement to disperse it. A considerable percentage of this smoke could be prevented by the use of a gas poker for kindling the fire. With the low chimneys and low pitched roofs of the bungalows there was a great tendency on a calm day for smoke to hang about; very little dispersal takes place. In his opinion an effective remedy for preventing this smoke emission was by educating the householders in the proper control of the stoves, e.g., attention to the damper, regular cleansing and removal of ashes from the ash pan and avoidance of using the stove as an incinerator for domestic refuse. Coventry Corporation had several schemes of district heating for the central reconstruction area of the city under consideration. No positive proposals had yet been decided upon, but it was felt that a scheme would be practicable in the central area, where the complete redevelopment would facilitate its provision.

Councillor A. Sweeney (Stocksbridge) said that a previous speaker had spoken of the lack of co-operation on the part of the Ministry of Health Regional Departments with the Local Authorities regarding the housing position. Regarding district heating for new estates, this had been given much consideration but was finally turned down because the geographical aspect did not lend itself to that form of heating. However, they did decide on central heating but the tenders received were approximately £110 per house above the Ministry's recommendation and of course they were not accepted. They cut out everything possible, except the central heating and although the figures were still higher than the Ministry's, they sent them in again. Again they were returned as not satisfactory. However, they were determined to keep their houses as they had submitted them the second time and decided to send a deputation to Leeds with the story that the only thing left to cut was the central heating ; and as the price they had presented was within striking distance so to speak of their recommendations then they were prepared to ask the Ministry of Fuel and Power to intervene on their behalf, from an economical point of view. Whether it was the veiled threat of contacting another Ministry or the persuasive methods of the deputation he could not say, but this he could say, the deputation came back with permission to build, and their programme at that moment was well under way.

G. Gould Marsland (Cheltenham) stated that this was the first Conference of the Society he had attended and being greatly interested in the turn the discussion had taken was tempted to report what his Council had done with a view to reducing smoke nuisance. As the Officer responsible for housing development he had made certain recommendations in the pre-war period. These had resulted in an offer being made by the Gas Company, and subsequently accepted, to lay on a gas supply and provide points for cooker, domestic water heater and two bedroom fires all for a figure of 25/- per house. For a further payment of 11/- a gas connection to a coke burning inset was provided in the living room grate. This resulted in smokeless fuel facilities being available in a large number of new houses. With post war housing it was proposed to improve upon this arrangement by adding a solid fuel boiler as this was the most efficient method of providing hot water in the home and furthermore consumed smokeless fuel. Unfortunately this boiler had been deleted from the Second Contract on the instructions of the Ministry of Health in order to bring down the price of the houses. The Electricity Undertaking was now installing five power points free of cost, presumably as a counterblast to the action of the Gas Company. Thus the tenants had two forms of smokeless heating as the result of healthy competition. Personally he felt the loss of the domestic boiler was serious and seemed to indicate that they were building houses down to a price instead of up to a standard. A lady Councillor from Richmond had asked what could be done with existing houses as most of the talk hitherto had been in connection with post war building programmes. The answer was, of course, that new appliances could as a rule be fitted to existing houses which in most cases would without doubt result in marked economies in fuel consumption coupled with the almost complete elimination of smoke. The fittings would have to be in good supply before this change over could be carried out and further this matter would be the responsibility of the owner or possibly shared by arrangement between the owner and tenants. In this direction, Mr. Marsland stated, lay the way to the economy in domestic fuel consumption desired by the Minister of Fuel and Power.

Councillor J. Duffus (Bexley) regretted that his Council had not yet joined the Society, but hoped to have this rectified in the near future. The previous speaker had implied that the Minister of Health was not prepared to agree to loan sanction for housing schemes incorporating the latest models of smokeless stoves, owing to the increased cost. Mr. Alderman Charles Key, M.P., had given a definite assurance that the Ministry of Health agreed in principle with the Simon report, and that no scheme would be turned down because of cost of new appliances. The Government had only been in office for a short time and wheels moved slowly, but co-operation by all concerned would ensure the best use of coal and every modern type of appliance.

Councillor Mrs. M. Dale (Wolverhampton) emphasized the fact that if the Smoke Abatement Society was to make any headway it must be realized that efforts must be made to get the women organized. Nothing could be done unless women were convinced that in addition to being a nuisance smoke was injurious to the health of the nation, and their families in particular. She asked what the Society was doing to supply housewives with apparatus and the proper fuel for smokeless fires. On inquiry she had found that whilst the grates were available the fuel was not. She sincerely asked the men at the meeting to convince their own womenfolk of the importance and necessity of smoke abatement.

Councillor J. Cool (Ebbw Vale) suggested that the conference should meet in an industrial area, and said that if they came to Ebbw Vale delegates would soon be finding the time of the next train home or seeking treatment to have grit and dust removed from their eyes. However, new plant at the steel works in the town was expected, when completed, practically to free Ebbw Vale from dust and grit. He hoped that legislation would soon be obtained giving increased power to local authorities.

W. W. Foakes (Chief Sanitary Inspector, West Bromwich) said that the figures given in the West Regional Report on smoke prevention in new houses were very disturbing. The report gave 41% new houses as being equipped with old-type firegrates. This 41% would be added to the already large number of old-type firegrates in use and smoke producing. In view of these figures, one of the largest fuel distributors in the district was contacted, and it was found there was not sufficient smokeless fuel to go round. The demand for smokeless fuel was greater than the supply. The ordinary " coalman " often advised on the most suitable fuel for the domestic firegrates, and an invitation should be extended to the fuel distributive trades to be present at the conference. In many instances the wrong fuel was burned on the domestic grate. Fuel from opencast workings was causing a lot of smoke by burning on the open domestic grate, and often the best coal was issued to the consumer with the poorest type firegrate. There was no selection of fuel. The solution appeared to be the provision of more smokeless fuels, and smokeless fuels should be produced at the " pit head."

Councillor A. H. Chaplin (Holborn) said that as a representative of a neighbouring authority to the City of London he had been interested to hear of the suggestion that the City might introduce district heating for reconstructed blitzed areas. Holborn, and also other much damaged districts, in London and elsewhere, would be glad to have more information about the project. Was it to be applied to land owned by the Corporation, or was it to be a service supplied to buildings or privately owned land ? Were there any means by which a local authority could induce private consumers to use such a service if it were provided ? His own Council were interested in the possibility of district heating in a mixed residential and commercial area. If Holborn were to benefit, when the wind was in the East, from a smokeless zone in the City, it would be a poor return to send smoke into the City on the rather more frequent occasions when the wind was in the west.

Councillor J. Burnip (Easington R.D.) said that smoke pollution was of great concern to his Council in a large coal producing area. A previous speaker had stated that in some parts of the country mineworkers received free coal of Grade I quality. This was wrong because in many parts it is of shocking quality for heating purposes and metallurgically destructive to the open grate fire. In referring to electricity he said that the colliery companies, which supplied the basic product coal, also retailed to their workmen the energy with which they are supplied from the power companies. The snag was that the charges made to the householder were prohibitive for the purposes they were endeavouring to promote in their town planning schemes—devices and equipment to abolish the open coal fire.

C. A. Stansbury (Walsall) said that the Simon Report had indicated some 62,000,000 tons of coal were used in 1938 for domestic purposes, and the Report also envisaged a much heavier demand ; new houses built to-day required space-heating and hot water for washing, baths, etc. Every house built to replace a slum house would require hot water and space heating, and there was a tremendous number of houses in this country occupied by our best class of artisan without any means of providing constant hot water, except from utensils placed on the firegrate or cooker. The occupiers of these houses would soon be demanding constant hot water supplies, it was an amenity that no one would deny them. This would appear to indicate that the demand for heat energy for domestic purposes would show a sharp rise in the years to come. It was all the more necessary, therefore, to make plans now to meet the situation to ensure that every appliance placed in our new houses was the very best that could be obtained from the point of view of space heating, provision of hot water, fuel consumption and smokeless combustion.

Councillor A. J. Ogden (Feltham U.D.C.) said that during fifty years plumbing the damaged caused by smoke had been forcibly impressed on his mind. His Council was installing new types of grates and warming units in their new estates, but the high cost of gas and electric fittings was preventing their use.

Mrs. F. E. Lea (Ministry of Fuel and Power) said she had read with much interest the regional reports summarizing the replies to the questionnaire sent out by the Executive Council and reviewed by their Secretary that morning. She was glad that he added a brief statement of the remarks made by Sir Guy Nott-Bower, Deputy Secretary of the Ministry of Fuel and Power at the recent "Fuel and the Future" Conference. The proceedings of the Conference were, she gathered, to be published and she hoped that the resumé of Sir Guy's remarks would be re-read by those present as it set out what was being done by the Central Government with regard to implementing the recommendation of the Simon Report and what was intended should be done in the future. Supplies of solid-fuel-burning appliances were so short that the Ministry of Health were recently obliged to issue an instruction that except in rural areas, etc., where solid-fuel cookers were installed, only one cast iron solid-fuel-burning appliance should be provided for each house. Any further slow-down of production would jeopardize supplies still more. Now, it was only during the war that many of the improved and efficient types of appliance had been developed and before production could begin new moulds are necessary. The shortage of labour in the iron foundries was desperate and although most of the larger manufacturers had developed improved models, the rate at which they could change from the production of pre-war models to these was necessarily slow. The weekly output was growing, however, and by April or June of next year should become a flood. Local authorities could in the meantime do much to help speed this turnover by demanding the improved appliances and this would at the same time bring pressure on the laggard manufacturers who were content to turn out smoke-producing, inefficient grates so long as their order books were full.

Apart from the contribution that could be made by the increased use of gas and electricity with a parallel decrease in the use of bituminous coal, the main contribution towards domestic smoke reduction must come from the increased use of smokeless fuel as recommended in the Simon Report. In his opening summary of the remarks made by Sir Guy Nott-Bower to local authority representatives at the "Fuel and the Future" Conference, their Secretary quoted Sir Guy as saying that "The National Coal Board have got this problem in the forefront of their programme." In fact Sir Guy pointed out that the vesting date for the National Coal Board was at present fixed for January 1st and that after that time we might expect to be given by the Board some idea of what they expected to achieve in that direction. In the main this increase must come from anthracite or manufactured fuel of which the principal type at present was coke. The total consumption of anthracite for domestic purposes before the war was 1.2 million tons, and the total output 6½ million tons compared with a total output of bituminous coal of about 230 million tons. Total production was now down to 3¾ million tons and any increase was clearly unlikely to affect the picture for the next few years. Increases in the supply of coke depended on the increases in capacity of gas works. The demand for gas was already so seriously straining the latter that coke production had dropped during the war. Significant increases in coke supplies were clearly long-term possibilities—at least they would not happen tomorrow. Lest she seemed to be rather gloomy, continued Mrs. Lea, she might mention district heating which had already been referred to by many speakers. This was an alternative method of forwarding the issue for smoke abatement. A number of schemes had now been approved. They in the Ministry of Fuel and Power hoped there would be many more.

J. W. Young (in a written communication) stated that one of the difficulties in the production of modern smokeless grates was the fact that the Ministry has carried out its negotiations principally with the research committees of the standard firegrate manufacturers' associations. These were essentially made up from the makers of the pre-war type of grate, who tended to work on their old-established systems and manufacturing arrangements, i.e., firms consisting of fine grade cast iron foundries. The bottleneck in foundry work, even before, and much more since the war, was labour of the moulder type and the difficulty of persuading new labour to take up that class of employment.

More scientific manufacturing firms, however, not essentially in the firegrate business, and especially those which had extended or started during the war period had concentrated on more modern methods where mass production was simpler, such as prefabricated mild steel welded construction work, to carry out which, hundreds of work people, both male and female, had been taught sheet metal forming and welding. Many of these people, moreover many sheet metal firms, were at present looking for work, or closing down. Moreover, scientific designs of firegrates had been developed both for fuel economy and for smoke abatement most suitable for that labour and type of manufacture. It was, therefore, obvious that, irrespective of the temporary shortage of steel plate, the various Ministries should concentrate on firegrates of mild steel prefabricated construction, many of which were already designed and awaiting mass manufacture by firms not in the above associations.

The treatment of coal for various utility purposes was never in its initial stages directly intended to produce smokeless fuels. The earlier forms, such as coke-ovens for the steel industry required clean coke for their furnaces, while gas retorts for public utility gas manufacture did not essentially make coke for public use ; both these undertakings discovered much later the value of their by-products. Even high and low temperature carbonization firms had not considered smokeless fuel in their original schemes, and only later produced special smokeless fuels by sacrificing a small percentage of their original products, the hydrocarbons, to produce special coke suitable for burning in coal-burning firegrates. Here again it was obvious that the Ministry should concentrate on coke-burning firegrates and the production of standard gas coke, if possible finding additional markets for the use of the extra gas produced in industrial heat requirements and even perhaps (in the future) gas turbines for electricity supplies, making the gas and coke at the collieries and distributing the gas over the country in a high pressure gas piping grid. If only coke and gas were produced from coal, no problem of smoke abatement would arise.

Dr. Hebblethwaite, replying to the discussion, wished to emphasize one point only. The report of the Durham and Northumberland Smoke Abatement Advisory Committee, for which he was responsible contained one point which had also been mentioned by other recorders and again had been mentioned in the discussion, and that point was in connection with the choice of the open fire. He asked the conference to remember the word choice as well as the open fire. He failed to see why the President, Sir George Elliston, spoke so optimistically about the future in his presidential address yesterday afternoon, after he had run over the events of the last twenty years. Twenty years ago, he attended his first smoke abatement conference at Birmingham. Then, he heard about the danger of domestic smoke caused by the open fire and remembered groups of people at that conference saying "Well, after all, the open fire is best." Throughout the years following that meeting, he had returned from similar conferences after hearing similar expressions of view and was perfectly certain that there would be members from the present assembly who would return and say that they had heard a lot of new ideas about heating but give them the open fire. He was not impressed, therefore, with optimism regarding the future and envisaged in twenty years' time similar discussions with similar views as to the cheerfulness of the open fire. He was of the opinion that even if gas and electricity was made cheaper and more readily available, even if the solid smokeless fuels were similarly made cheap and available, together with the new grates to burn them, and even if district heating became a definite fact, if the **choice** remained to have soft coal in an open fire there would be no progress. The remedy was simple but so outstanding that it might even appear ridiculous but it was that one factor which was essential if any progress was to be made and that factor was that it should be made illegal for raw coal to be supplied to any householder.

Dr. Martine, replying to the discussion, said that one aspect of the subject struck him forcibly while he was correlating the replies to the questionnaire—the need for educatoin—and education at an early age, for the older generations had shown that they were not a profitable medium for their propaganda. He asked all present to go home and try to get at the older school child and adolescent who join the rank and file of the youth organizations. The Society's booklet "The Smoke Problem and Science Teaching" had been well received and he was convinced that this was the only way to get under the skin of the people.

James Law, replying to the discussion, said that with regard to fuel burning installations in new houses, though this was a subject that should be brought well forward, they had a feeling of frustration with regard to efforts made. "The Housing Manual" and later the "Domestic Fuel Policy" gave them a "buoyant" feeling that they could do so much to solve the problem of domestic smoke : all they had to do was to see the various architects and Housing Committees, and everything in the garden would be lovely. Then they made enquiries from the Fuel and Power people about solid smokeless fuel supplies, from the gas companies about gas supplies, from the electricity departments about appliances and points for heating purposes, and they began to have some doubts about their plans. Finally, they went to the range-makers and asked them about deliveries of suitable fireplaces and possibilities of early delivery and became disillusioned with regard to any early solution of pollution from domestic fireplaces. He was also interested in the progress made with district heating, because he thought that their present method of "space heating" or heating the air of rooms was all wrong. Every time a door or window was opened the whole of that heat was dissipated to the outer air. The most rational way of heating buildings was to heat the fabric, the ceilings, floors and walls, so that the warmth could be stored there, in other words, the "panel heating system."

F. J. Redstone, replying to the discussion, said that Sir George Elliston had said he was an optimist and he too wished to join the President in an optimistic viewpoint for the future, particularly as at the recent "Fuel and the Future" Conference which he had been privileged to attend the need for fuel efficiency had been stressed at every session and this gave him to feel that the demand that fuel be used more efficiently than in the past would no doubt do more for smoke abatement and prevention than all the arguments they had ever put forward on public health grounds. One most important thing in the Society was the power of example. It mattered a great deal what they were preaching to others but what are they themselves practising ? What was the speaker himself doing ? What were those in the body of the hall doing towards smoke abatement ? It was not unknown that local authorities created nuisances with their gas and electrical plants and he was satisfied that the eyes of the people would always be on these things and they must by the power of example set a lead to those they wished to convert. He was able to report a great stirring of interest on smoke prevention in the West of England area covered by the Bristol and District Regional Smoke Abatement Council, and there appeared to be a determination to plan in the future for prevention against atmospheric pollution.

SECOND SESSION

Friday Afternoon, 25th October, at 2.30

PROPOSALS FOR NEW INDUSTRIAL LEGISLATION

Chairman : **Councillor Miss D. E. Stringer**
(Chairman, Public Health Committee, Brighton)

(The draft byelaws submitted by the Executive Council are printed as a separate pamphlet.)

THE FUEL TECHNOLOGIST'S VIEWPOINT

by SYDNEY N. DUGUID, B.Sc.Tech., F.Inst.F., F.R.San.I.

To prevent atmospheric pollution and promote efficiency an industrial fuel-burning plant must be (a) correctly designed and equipped ; (b) adequately maintained and (c) operated by a trained and experienced staff.

The necessity for observing these basic conditions is recognized by all Fuel Technologists and, particularly by those who, for many years have tried, by exhortation, to get them universally accepted.

Any proposals therefore, of a practical nature, that would ensure the observance of these conditions by all owners of fuel-burning plant, ought to be welcomed and supported.

Would the preliminary proposals of the National Smoke Abatement Society, for new legislation, help towards this end ? Unquestionably they would. They are right on the target. If they became law the end of atmospheric pollution by industrial smoke, and also of fuel waste, would be in sight.

The proposals have the virtue of simplicity. They can be understood by anyone, even by those who have only a nodding acquaintance with industrial fuel-burning plant.

As regards New, Altered and Additional Plant (*A* (*i*))

Under the byelaws suggested by the Society, approval of the plans of a proposed new fuel-burning plant, or of major alterations or additions to an existing one, would have to be obtained from the local authority before the work was put in hand. Building plans have already to be submitted to the local authority and to extend the scrutiny to the plant which they may contain would present little difficulty.

Suitable draught with accessible control, an adequate chimney, instruments necessary for controlling combustion, and some arrangement by which the firemen can immediately become aware of smoke emission, would have to be provided. Most modern fuel-burning plant are equipped in this manner and it would be unreasonable to require that older plants should be brought up-to-date, as far as practicable.

It is possible that the above proposals might be welcomed by those concerned, as the local authority would relieve them of all anxiety as to whether their plant could be operated to conform with the smoke bye laws. Unbiassed assistance of this nature might save much fruitless expenditure, and foster the spirit of co-operation, so essential in these matters, between the owner and the local authority.

Any steam-plant engineer is able to retail instances of ill-advised expenditure and the author could give chapter and verse of many cases where sums up to £350 per boiler have been spent without beneficial results.

These proposals would also encourage designers of plant to place avoidance of atmospheric pollution amongst the principal objects of their designs.

A modern boiler plant which the author once visited was sprinkling the area with so much grit that a man was employed full time, sweeping it up from the roadways inside the works and clearing it from the gutters and downspouts. To abate this nuisance now the plant is at work, would probably entail the expenditure of some thousands of pounds, whereas with a little forethought on the part of the designer it could have been avoided at a reasonable additional cost. If the plans had been checked from the smoke abatement angle the certainty of a grit nuisance arising would have been foreseen, and the necessary provisions made to avoid it.

As regards Maintenance, Operation and Care. (*A* (*ii*)).

With regard to maintenance, operation, and care of a fuel-burning plant, the proposed byelaws Nos. 8, 9 and 10, insist upon the plant being kept in good working condition, that heating surfaces and flues be kept clean, and that overloading to such an extent as to cause smoke and grit emissions, shall not be indulged in.

These requirements are in line with modern practice and no fuel technologist, or plant engineer, would criticize them adversely.

As regards registration of Boilers, Furnaces and Firemen. (*A* (*iii*)).

Under the above proposed new sub-section only trained men would be allowed to operate fuel-burning plant which required skilful and experienced handling to prevent air pollution.

The local authority would keep a register of such plant and the firemen or operators would be licensed.

The importance of this proposal cannot be exaggerated. Those closely associated with fuel-burning plant, have, for a great many years, recognized the fact that the operation of such plant demands the services of skilled and experienced men. The men on the firing floor can make or mar the running of any plant however well designed and equipped. Thorough training is essential.

This proposal would benefit the fireman by raising his status and the owner would have the satisfaction of knowing that his plant was being run by competent men.

Any local authority, or group of authorities, deciding to adopt this proposal would naturally ensure that suitable courses of instruction, for the men they proposed to licence, would be organized. The means are already at hand. Local authorities have control of technical schools and also possess a variety of fuel-burning plant at their electricity works, gas works, water works, baths and hospitals, which might be used for practical instruction. What better facilities could be found, or devised, for training operatives and any others, concerned with the matters under discussion ?

Observing a chimney top, stop-watch in hand, and an occasional prosecution will never solve the smoke problem although they may do something to curtail it.

These new proposals are drastic and far-reaching, but practical, They do not go beyond the bounds of technical possibilities and, if universally adopted, we could look forward, with certainty, to the time when industrial smoke and fuel waste would be just a memory of the bad old days.

THE SMOKE INSPECTOR'S VIEWPOINT

by GEORGE W. FARQUHARSON,

Senior Smoke and Factories Inspector, Birmingham.

By these proposals submitted for general discussion by the Society we are starting on a new chapter in Smoke Abatement history, with the main object still in view of removing as far as possible the ill effects suffered by the ordinary citizen, especially those who live in our large industrial areas.

Now that the Government and Local Authorities are engaged in reconstructing the fabric of civilian life in such matters as new towns, re-distribution of industry, health services and housing, etc., surely in this changing pattern a place should be found for measures that will promote those essential commodities of life—sunlight and pure air.

Whatever the defects of these proposals, they do provide a basis to work from, and from an Inspector's point of view they fill in certain gaps in National legislation which in the main will prove beneficial to all.

The foreword to these proposals states they are to be regarded as provisional, therefore, the question whether such provisions come within the scope of existing powers to make byelaws under Section 104 of the Public Health Act, 1936, or whether it will be necessary to promte an Amendment Act, is a matter for legal opinion, but in my view a special Amendment Act will be necessary.

Now let us consider the proposed byelaws, as regards new, altered and additional plant (A(I)), Para. 1-7. The principles involved here are commonly known as " prior approval," or prevention is better than cure, and one must agree it seems common sense to endeavour to ensure good combustion conditions at the firegrate end, than to deal with the installation or chimney as a statutory nuisance should that event arise. Prior approval of new fuel burning plant is being carried out in a minor form with good results in several large industrial cities at the present time. The method of procedure is for those engaged on smoke prevention to approach the owners or architects who submit plans of industrial buildings and chimneys for approval under the building byelaws ; the object being to persuade those responsible for the new installations to instal the most modern equipment possible, and also to ensure that the chimney stack will be a reasonable height compared with the surrounding buildings.

Another form of prior approval is also being operated by Local Authorities concerned with re-development and reconstruction ; this is done by means of a clause in tenancy agreements, when land owned by the local authority is being re-developed for industrial purposes ; some private trading estates also have similar covenants in their leases for factory premises.

Regarding Maintenance, Operation and Care. (*A* (*ii*)), *Paras.* 8-10.

The first thing to note is that these paragraphs deal with existing plant. They are in a degree supplementary to Section 101, para (I) of the Public Health Act, 1936, which deals with any installation for the combustion of fuel, and which does not as far as practicable, prevent the emission of smoke into the atmosphere, subject to the qualifying clause Section 109, and by carrying out the principles under this heading the owner would, in effect, be using the best practicable means to ensure efficiency and good combustion of the fuel in use, and also of providing for the maintenance of adequate and proper plant.

As regards Registration of Plant and Licensing of Firemen. (*A* (*iii*)).

I see no difficulties regarding the registration of certain plant, but the question of Licensing of firemen or furnacemen to operate these registered installations is, in my opinion, a most controversial subject. Working conditions, grades of fuel, different peculiarities of similar plant, vary so widely in the industrial field, that in granting a license to any fireman or furnaceman possessing the necessary skill and knowledge in the firing and operation of any specific installation would not guarantee that the same person could operate a similar installation in another works without making smoke.

On the question of revoking or suspending such a licence. I think such extreme measures as to interfere with the rights and privileges of a man to earn his livelihood as a fireman or furnaceman will by no means help the cause of smoke abatement! Granted these proposals allow for an aggrieved person to appeal to a Court of Summary Jurisdiction, but, in the meantime, until the appeal is heard that aggrieved person cannot, according to the proposals, carry on his job of firing or operating the registered plant, except under a penalty not exceeding five pounds.

Another point in these proposals is the lack of provision made for a person to start being a fireman or furnaceman. He may have the necessary knowledge, but, as a beginner he cannot possibly have the skill or experience. Therefore, provision should be made for supplementary or beginner's licences.

Conclusions.

I think the principles relating to prior approval and maintenance are worth while pursuing, but I don't agree with the licensing of personnel. I feel it is the obligation of the owner of the plant to see that he employs the right type of man, and to give him good working conditions as regards adequate and well maintained plant, together with that important point of all good fuel.

On the question of the byelaws themselves, it is recognised that any byelaws must not conflict with the Act under which they are made, therefore, that so-called exemption claimed by the steel trade, collieries, and clay industries will need further clarification, otherwise these bye laws will be appertaining only to boiler plants, and finally it would appear that private sea-going vessels, whilst liable under Section 267 of the Public Health Act for prosecution for the emission of black smoke from the funnel, would be exempt from any type of byelaws, by virtue of paragraph 4 of that section.

THE STOKER'S VIEWPOINT

by ERNEST BOWLES.

I am greatly interested in the proposals placed before this conference for two reasons. I am employed in the greatest coal processing industry and live in one of the largest industrial cities, Birmingham. The subject of smoke abatement is therefore one in which I am particularly interested, both as an employee and as a citizen of no mean city.

The emission of smoke into the atmosphere is a sign of incomplete combustion and indicates a waste of the country's wealth. One of the most serious aspects of smoke emission is atmospheric pollution. The important task before us is to see how far the dust and sulphur compounds in the flue gas can be prevented from issuing into the air.

The actual damage done runs into several millions of pounds per annum. In the old fashioned domestic grate little more than ten per cent. of the potential heat of the coal is usefully employed and clouds of smoke are produced. The industry in which I am employed has, by utilising the smoke and fumes, instead of letting them go up the chimney, played an important part in the domestic sphere towards smoke abatement. In all cases in the industrial field where coal is used with a low efficiency, I submit that gas would provide a desirable alternative.

Dealing with the question of industrial smoke abatement we all pay our tribute to the technical development in this direction which is evidenced in the larger factories. Unfortunately some of the smaller industrial concerns are not so up to date,

Progress lies in careful control and efficient supervision of plant. The proposals submitted for your consideration are a definite step in this direction and, speaking as an operative, I find myself in complete agreement with most of them.

I am certainly of the opinion that a survey should be taken of all fuel appliances by competent people, appointed by the local authority, who should have power to see that coal is not burnt in a haphazard fashion.

Whilst appreciating the penal clauses of the proposals I think these in themselves are not enough. Competent instruction should be given by technicians on this important point. All fuel burning appliances should be registered with the local authority and subject to examination from time to time.

I think also that boiler houses and other buildings, where fuel appliances are installed, arrangements should be made whereby the stoker could see at a glance the smoke that is being emitted from the chimneys. I may say a word here to the technicians, I would suggest that they apply their mind to the question of ensuring complete combustion where the burning takes place as this appears to me to be more important than dealing with the smoke after it has been created.

A definite step to the end we seek to attain could be achieved by ensuring that the right type of man is employed as a boiler attendant. I do not believe in the principle of registration as it appears to me to be a still further encroachment on the rights and liberties of the individual. I think this object could be achieved by insisting that in all our industrial agreements the stoker's job is definitely graded with an attractive rate of pay. This already operates in most of our principal industrial agreements. I think also that a fireman or furnaceman, holding as he does a very responsible job, should have had a proper period of training under a qualified man before taking over responsibilities, and should not have additional duties placed upon him which should take him away from the boiler house or furnace at periods to do other classes of work.

I feel confident with the technical developments which are taking place in the country to-day, proper legislation to ensure supervision of all fuel burning appliances, legislation to deal in a proper manner with people who deliberately break the law and with the development of the right type of personnel to take charge of fuel burning appliances, that we shall succeed in our object to change the black streets and black and grey skies which are depressing and unfortunately universal in British industrial towns.

THE INDUSTRIALIST'S VIEWPOINT

By H. A. HUMPHREY, *M.I.C.E., M.I.Mech.E., M.I.E.E., F.Inst.F.*

TABLE OF CONTENTS

Page

43 **Introduction.**
44 **Requirements for New Legislation.**
45 **Classification of Smoke.**
45 **Cause and Prevention of Sooty Smoke: Its Relation to Quality of Finished Product.**
46 **Measurement of Smoke Density and of Dust.**
47 **Appointment of Smoke Inspectors.**
48 **Sources of Smoke.**
49 **Analysis of Internal Coal Consumption in 1938 and 1945.**
49 **Qualities of Coal Obtainable.**
50 **Reasoned Proposals for Regulations Governing Various Industries:**
  (a) **Registration.**
  (b) **Location of Industry. Smokeless Zones.**
  (c) **Approval of Appliances.**
  (d) **Height and Number of Chimneys.**
  (e) **Compulsory Installation of Measuring Devices.**
  (f) **Consideration of Individual Industries.**
    (i) **Power Stations and Other Large Steam-Raising Plants.**
    (ii) **Small Boiler Plants Using Shell Boilers.**
    (iii) **Railways.**
    (iv) **Oil-Burning Equipment.**
    (v) **Gas Works and Coke Ovens.**
    (vi) **Iron and Steel Works including Engineering Works.**
    (vii) **Clay Industries including the Potteries.**
    (viii) **Cement Kilns.**
    (ix) **Lime-Burning Kilns.**
    (x) **Suggestions for Research.**
60 **Discussion and Conclusions.**

Introduction.

Following an inquiry of the National Smoke Abatement Society to industrial circles it was suggested that the author should prepare a paper giving his views as an " Industrialist " on the legislative proposals contained in the Society's pamphlet "Industrial Smoke Prevention Proposals." The Society then issued an invitation to the author to give a paper on the lines suggested and mentioned that the Society was anxious to have any criticisms or alternative suggestions.

The author has therefore assumed that the invitation includes the consideration of alternative proposals designed to attain the same ends but by a much more practical and effective method of procedure.

He believes that the occasion is opportune to bring together those ideas which he shares with the leaders of Industry and which may be expected to produce the maximum smoke abatement in the minimum time.

The present paper has therefore been written to put on record those far-reaching legislative proposals which Industry is prepared to accept in order to prepare the way for the enforcement of regulations leading to the highest practical standards of smoke and dust elimination.

Requirements for New Legislation.

Leading industrial firms have already, by research carried out by their own staffs and by the work of their Research Associations, made possible very important progress in the scientific combustion of fuel and in combustion appliances. The result has been a greatly improved fuel economy and, since an increased economy is accompanied by a diminution of smoke production, Industry has been the chief contributor to the solution of the Smoke Abatement problem. The advances made in fuel efficiency have been fully recorded, under industrial headings, in the sixteen papers read and discussed at the Joint Conferences of the Institute of Fuel and the National Smoke Abatement Society held in London, Manchester, Doncaster and Nottingham in 1945 and 1946. They show clearly that these advances originate internally and are the result of a continuous progressive policy. In other words, Industry is leading the way in Smoke Abatement and is the best advocate of the movement.

Industry is not averse to legislation on the subject provided it is realistic and based on what is practical and reasonable. In fact such legislation is welcomed by Industry as being the only way of ensuring that the small backward or selfisfih minority, which exists in any section of the community, is compelled to conform with practices which the vast majority of industrial fuel consumers will have voluntarily adopted in the common interest. But the qualification that the legislation should be realistic and based on practical and reasonable considerations is all-important, for ill-considered legislation can lead to disaster in one of two ways. If the regulations are enforced, then great injury can be done to the capacity of this country to produce ; and increased production is essential if we are to remain a first-class Power. If the regulations are not enforced, then the door is thrown wide open for evasion of all kinds.

It is essential, however, that all such legislation should be administered in a competent but co-operative and sympathetic manner, so that the manufacturers will regard the inspectors and others responsible for enforcing the regulations as friends trying to help them with their smoke-production problems and not merely as officials whose sole object is to secure convictions.

This paper will show that the framing and administration of regulations for smoke control, which can be regarded as constructive and reasonable, bristle with very difficult scientific, technical and economic problems. It is therefore necessary to make it quite clear that, if there is to be legislation of this type, then Industry will require that it is framed at the highest level with the assistance of the best available experts. Its administration must be controlled under the Ministry of Fuel and Power. All matters relating to Standards, tests, and approval of appliances must be decided and defined at the level of the Government's Fuel Research Station, the Department of Scientific and Industrial Research or a special body appointed for the purpose.

There is nothing in all this which reflects on Local Authorities, as such, but it is in keeping with the strong tendency to transfer their powers to more central organizations better equipped to carry them out. Thus twelve powers formerly exercised by Local Authorities have been, or are in process of being, taken away from them. The list starts with the Licensing of Passenger Road Services in 1930, includes Police and Fire Services, and may end with the nationalization of Municipal Gas and Electric Supply undertakings. We are passing through a period in which Local Authorities are losing control of those services which necessitate their maintaining highly qualified and specialized technical staffs.

Classification of Smoke.

We may divide smoke into two broad classifications :—

(a) Black or brown sooty and tarry matter.

(b) Fine dust and sometimes also coarse grit from processes where combustion is substantially complete.

In some cases, e.g. from cement kilns, most of the dust is not due to the ash in the fuel but to materials entering or leaving the main process. We shall exclude from consideration here the dust omitted from a few specialized processes such as certain mineralogical and metallurgical processes which in any case are highly localized and do not affect the real problem as it concerns the country as a whole.

Cause and Prevention of Sooty Smoke : Its Relation to Quality of Finished Product.

The ordinary dark or black smoke emitted from chimneys is due to incomplete combustion of the fuel, usually because of too great cooling of the flame. Under steady load conditions and over quite a wide range of load, no smoke of this character should be evolved from large oil or coal fired furnaces for raising steam. Some smoke is perhaps inevitable when starting up from cold if no auxiliary gas burners are available, but the usual cause of this type of smoke is either bad design, uneven firing, or substantial overloading, e.g. during sudden demands for steam.

Consequently, in normal furnaces in which coal is burnt, smoke can be avoided by adding fresh fuel in such a way that the tarry volatiles evolved are consumed by passage over or through red hot fuel or past red hot refractory (brickwork) always provided that there is sufficient excess air left in the flue gases to burn them. In boilers this is done by mechanically stoked furnaces such as the travelling grate with refractory front arch or by the underfeed retort stoker but it can also be done by careful hand firing. But for certain metallurgical or ceramic processes, slow heating under reducing (i.e. air deficiency) conditions is necessary : smoke cannot then be completely avoided, though in some cases furnaces are being evolved in which some of the smoke is being consumed by the addition of hot secondary air at the back end. The solution for some of these processes may be the use of gas or coke firing or of electric heating, though often at higher cost.

Unfortunately coke will not always produce the required conditions (of temperature or atmosphere) in furnaces so far devised and neither will gas. (A particular example is in the production of certain qualities of high grade burnt lime—neither coke nor gas firing will give the quality that can be obtained with coal). On the other hand, gas and electric furnaces have been devised for some processes which give a better product or are so much easier to control that their higher running cost is offset by their advantages. The quality and price of the finished product remains, however, of paramount importance—most manufacturers are constantly striving to improve the quality of the products and obviously production managers will not instal types of furnace, however smokeless, if they are going thereby to lose the market for their goods, nor would any Government force them to do so. In short, the chemical and physical changes that occur in some manufacturing processes must be taken into account when we talk of carrying out those processes smokelessly.

The question then arises—can the sooty smoke particles once formed be removed in some form of mechanical eliminator similar to the devices used to remove dust. Unfortunately, with present knowledge this is not practicable on a continuous industrial scale even with very expensive equipment—the reason being that the smoke particles are either extremely fine or are so light and fluffy that they cannot be caught by devices so far known.

Those smoky processes which under present knowledge cannot be economically replaced by smokeless processes without sacrifice of quality of finished product should therefore be the subject of continuing research. Alternative processes and furnaces should be studied as it is doubtful if it will ever be cheap to remove from final (chimney) flue gases the particles which go to make up sooty smoke.

Measurement of Smoke Density and of Dust, etc.

Past legislation has only referred to the emission of black smoke from chimneys attached to specified processes and to the taking of the best practical means for preventing a nuisance due to grit and dust etc. It has neither defined black smoke nor best practicable means. No Smoke Inspector can work efficiently with such ambiguous phraseology nor can the designer of new plant.

During the past ten years or so, photoelectric cells have been developed for use on industrial plant and it is now possible to install a device in a chimney which will continuousy record on a chart the actual density or light obscuring power of a smoke or dust and even sound an alarm when a set limit of obscuration is exceeded, for example 50% obscuration of light in a 10 ft. column.

The determination of dust emission from a plant has been covered by British Standard Specification 893. The procedure is so complicated, however, that, with very few exceptions indeed, dust extraction plant is only tested for performance by its manufacturer and then only for an acceptance test. Under such conditions, all the plant is new and it is run under the best possible conditions. Most boiler plants, even at large Power Stations, are neither staffed nor equipped for making regular routine tests to determine whether their dust arrestors are in need of adjustment. Sometimes increased dust emission is due not to the deduster but to the quality or quantity of dust in the gases fed to it.

Plants burning over 1,000 tons/day of coal can well afford to make routine tests but some simplification of the procedure of BS.893 is required for such tests and it is to be hoped that the B.S.I. Committee concerned will issue immediately an interim note or addendum to the specification giving guidance on the matter. These Committees work slowly in the preparation of detailed specifications, but the subject is one of some urgency and one in which the experience of industry of tentative methods would be valuable to the Committee.

One drawback to existing methods of test is that dust burden is not uniformly distributed across the section of a flue nor is the gas velocity uniform. Simple mixing baffles are, however, capable of design which can be inserted in the gas stream when tests are in progress and removed or turned out of the way when not in use.

If sampling were to be carried out at one point, automatic samplers could be devised which would collect a fair and proportionate sample of the dust being discharged to the chimney and measure the gas volume. With this form of apparatus in regular use, measurements would be obtained of the dust discharge under normal operation conditions and not merely when the personnel are running their plant under the best possible conditions. The necessary development of the apparatus should be a high priority at the Fuel Research Station, an accuracy of 85-90% will be quite sufficient. Probaby the apparatus will still not be suitable for short and twisting flues ; new boiler plants should have their flues laid out so that testing for dust emission is made simple.

The process of testing is too complicated and involves too much equipment for the tests to be made by any Smoke Inspector, but a step forward in ameliorating conditions would be taken if Large Scale Industry were made to carry out tests by an approved method at regular intervals and disclose their results to responsible centrally controlled officials. As interpretation of figures is not always easy, the figures should not become the property of Local Authority Councils as they have not the trained staff for a technical appraisal and comparison of the results. Industry would probably be perfectly willing to co-operate under these conditions—it is, however, averse to allowing its operating figures to become the subject of local debate and local politics. An immediate start might well be made with all public utility (public and privately owned) Power Stations, who are, after all, under some jurisdiction by the Electricity Commissioners, the body which has already issued general instructions but never followed them up by examination of performance. An annual or biannual performance test on each individual unit (before and not immediately after routine overhaul) would give the management sufficient information on the performance of their plant and would not be out of step with ordinary routine production efficiency measurements.

Appointment of Smoke Control Officers.

When the Government proceeds with further legislation on smoke control, the framing of regulations should, as said in the introduction, be a matter for Central Authority. This argument is also reinforced by the success of the centrally controlled Alkali Inspectorate which all will admit have been and continue to be friends of Industry in the design and operation of plant to reduce the emission of certain chemical fumes below limits specified by law. The Alkali Inspectors are men of the highest technical qualifications and they have all had considerable experience in Chemical Industry before appointment. Manufacturers can not only rely on them for technical assistance, even sometimes to the extent of research in the Inspectorate Central Laboratories, but they also know that their own commercial processes and policies are kept secret. Finally, there is the tradition that the Alkali Inspector only initiates prosecution as a last resort and in fact one can infer from perusal of the Chief Alkali Inspector's annual reports that he regards as a good year one in which there have been no prosecutions.

The author would therefore suggest here that the Government appoint a centrally controlled Smoke Control Inspectorate consisting of a few highly qualified combustion engineers working under the Ministry of Fuel and Power. This Ministry has already a central Fuel Efficiency Committee with its Regional Engineers and it may prove possible to combine the duties of Smoke Control Officers with those of the Fuel Efficiency Engineers, choosing men who would administer the central regulations sympathetically though firmly.

Sources of Smoke.

Let us now consider the major sources of smoke in turn and outline some proved methods whereby the smoke can be reduced to negligible density and the dust emission to relatively harmless quantities, always bearing in mind that we must not ask for too much nor expect perfect conditions to obtain at the stroke of a pen and that general comprehensive regulations cannot be made to cover all types of industry.

It is convenient to divide the sources of such emission into the following nine groups, all of which were discussed at the 1945-46 Joint Conferences with the Institute of Fuel.

(1) Power Stations and the larger industrial boiler plants using water tube boilers.

(2) Smaller industrial boiler plants, including collieries, which use shell boilers.

(3) Railways.

(4) Oil burning equipment.

(5) Gas Works and Coke Ovens.

(6) Iron and Steel Works.

(7) Cement and lime burning kilns.

(8) Clay Industries, in particular the Potteries.

(9) Domestic.

The attached table gives figures for the consumption of coal by these industries in 1938 and 1945.[1, 2 & 3.]

ANALYSIS OF INTERNAL COAL CONSUMPTION FOR 1938 AND 1945

	MILLIONS OF TONS			
	Year 1938	% of 1938 Total	Year 1945	% of 1945 Total
Collieries	11.9	6.6	10.6	5.9
Gas	18.2	10.1	21.0	11.8
Coke Ovens	19.1	10.6	20.0	11.2
Electricity	14.9	8.3	23.5	13.2
Railways	12.5	7.0	14.9	8.4
Iron and Steel	11.6	6.4	9.5	5.3
Engineering & Metal Trades	7.2	4.0	4.0	2.2
Cement	11.0	6.1	5.8	3.2
Potteries	1.1	0.6	1.1	0.6
Other Industries (approximate)	24.8	13.8	19.5	11.0
Domestic Bituminous Coal	47.7	26.5	34.6	19.4
,, Anthracite			2.3	1.3
Miscellaneous			11.6	6.5
Total Inland Consumption	180.0	100.0	178.4	100.0

Qualities of Coal Obtainable.

There was a time when a large coal user could order coal of any required quality and be sure of regular supplies. He could thus control calorific value, chemical analysis, volatile matter and caking properties, ash, moisturs, size and mechanical properties. Under these circumstances fuel and combustion appliances could be scientifically adjusted and the plant tuned up to the highest efficiency.

To-day, coal distribution is so arbitary that many firms must accept any kind of coal sent to them and, while these regrettable conditions remain, smoke abatement regulations should be withdrawn rather than extended. Sympathy may be given to the Minister of Fuel and Power in his difficult task but meanwhile a heavy load of anxiety and worry is placed upon Industrial management. Improved methods of allocating coal to consumers according to desired quality are being worked out, but, before they can be effective, it will be necessary for the Ministry of Fuel or the Coal Board to classify the types of coal marketed into a perhaps large but still limited number of qualities and sizes. This is a big task, but until it is completed and a new system of marketing coal by quality is in effective operation, industries buying new coal consuming plants will not be able to specify exactly what coal the plant will receive, and hence no prediction can be made about the smoke producing characteristics of the plant.

From these remarks it follows that there would be many advantages in placing the Smoke Inspectorate under the Ministry of Fuel and Power, since they would then be in a better position to discuss with their colleagues on the fuel supply side steps which can be taken by a manufacturer, especially a manufacturer building a new plant, to avoid smoke emission. Moreover, if raw materials are equally available, industries from which it is difficult to control smoke emission should be encouraged to expand only in areas where the type of coal gives least smoke.

Reasoned Proposals for Regulations Governing Various Industries.

The following proposals are considered to be practicable as additional steps in Smoke Control Legislation and, as such, the author believes that they would be generally acceptable to Industry.

(*a*) *Registration.*

We already have so many authorities concerned with the running of industry and the erection of new factories that one hesitates to suggest yet another registration. At the present time, however, every coal and oil consumer has to apply for supplies ; consequently it is suggested that all that is necessary is for the Coal and Oil Fuel Supply Officers to register all consumers of more than say 25 tons/week of coal or oil with the "Regional Smoke Control Officer," giving him bare details of the quality and quantity of fuel which is required for full output of the factory, classified according to process and details of what he expects to supply.

(*b*) *Location of Industry.*

Although the Government is doing something towards the more careful siting of industries, it does not, as far as is known, take into account the contours of the land which can so often cause smoke from even high chimneys to be carried down to ground by wind eddies[4, 5]. Nor is it always realised by our Town Planners that the rarest wind of this country is almost without exception from the south-east and hence that the smokier industries should be located in the south-east part of the area concerned. Reference has already been made to the matter of suitable coal supplies.

Smokeless Zones.

Smokeless zones have been mooted for some cities in particular by the Manchester Corporation. Unfortunately, as the Leicester Survey shows[6], the average reduction in smoke at the centre of a square mile quite free from smoke emission would be only 25-30%. The conclusion from the Leicester survey and from measurements made in Hyde Park, London, would seem to be that such zones are no real solution to the problem of the large smoky town and that the only remedy is by drastic reforms in methods of burning raw coal.

(*c*) *Approval of Plant.*

Industry is opposed to the suggestion that individual items in every new factory should be approved by any central or local government authority. The procedure causes endless delay and unnecessary expenditure, overloads the officials and tends to discourage advances in design. It also tends to throw the responsibility for any poor performance of new plant on to the approving authority. It is "smokeless operation" that is required and this can be far better obtained by building the plant to a required specification of smokeless performance—the onus for smokelessness is then placed on the designers and operators. Suggestions are, moreover, made later for certain smokeless types of design for particular operation such as steam raising—these suggestions refer to general approval of types by the Central Inspectorate and generally speaking would involve only this Central Inspectorate and manufacturers of firing equipment.

Builders and designers of new plants should, of course, not be precluded from asking the advice of the Smoke Control Officers on the suitability of equipment they proposed to install, but the onus must not be put on the Inspectorate if a particular apparatus does not give the hoped-for results.

(d) *Height and Number of Chimneys.*

Following on a report of a special committee[4], the Electricity Commissioners have advised that Power Station chimneys should be at least 2½ times the height of the highest adjoining building with an additional allowance, where necessary, to compensate for down draughts caused by the contour of the land. The advisory committee assumed that if the chimney was sufficiently high, the discharge would be unaffected by down draughts caused by neighbouring buildings and ground contours, and that the flue gases would be discharged into a horizontally flowing stream of air. This suggestion does not take into account the mixing of streams of gases by eddy diffusion. Bosanquet has shown[7, 8] that the flue gases spread out in a cone of about 20° solid angle. Hence they will reach the ground about 10 chimney heights away from the base of the chimney, though greatly diluted. With large Power Stations, however, the mass of dust reaching the ground by this means is appreciable, particularly from powdered fuel installations equipped only with simple cyclone dust arrestors.

A recent study of the uplift effects of the hot gases from chimneys has shown that there are great advantages in the discharge of the flue gases from one chimney as compared with several chimneys—this follows from the reduced cooling effect of the ambient atmosphere on the gases when they are in one stream. Hence engineers should design for one high chimney (or at most two, allowing for maintenance) for every new or extended installation. This is a change from the practice 10-20 years ago, of installing batteries of relatively low chimneys at each boiler house. A minimum height of 250 ft. for Power Stations is also desirable to get above low " inversion " layers and because at this height there is always some wind[9].

The advantages of high flue gas velocity at the mouth of the chimney are discussed in Reference 10, where it is concluded by experiments with models that a velocity up to 60 ft./sec. is desirable.

Industry generally would welcome clear guidance from the Government on heights and numbers of chimneys, and though precise regulations cannot be laid down to cover every case, guiding rules can certainly be formulated. The low chimney which belches smoke and dust down on the surrounding ground should never be allowed to be erected, and steady pressure should be brought to bear on existing offending chimneys based on commonsense visual observation and not on complicated tests for smoke concentration at ground level which are difficult to devise and interpret.

Local Authorities have already some powers on the erection of chimneys which we need not discuss here. It is suggested additionally that the Central Smoke Control Inspectorate should have power to define the height and possibly the maximum number of chimneys to be installed first on steam raising plant and later, after experience, on other types of plant. The following regulations are put forward for consideration :—

(i) That Local Authorities immediately send plans for new chimneys to the Regional Smoke Control Officer for comment as to number, height and position relative to the contour of the ground and juxtaposition to other buildings and domestic houses.

(ii) That chimneys of new boiler houses consuming over 1,000 T/day of coal at full load should be at least 2½ times the height of the highest adjoining buildings with a minimum of 150 ft. above the height of the adjoining buildings. If the Smoke Control Officer has reason to believe that the contour of the land or nearby buildings would cause serious down draughts of the flue gases and residual smoke, he should have power to demand of the designers (but at least three months before construction starts) that tests are made with a model in a wind tunnel or with " no lift " balloons (as recommended in Reference 4) to determine and decide upon the minimum practicable height of chimneys desirable, having full regard to economic considerations.

(iii) That chimneys of new boiler houses consuming coal at a maximum rate of 100 T/day should extend at least 50 ft. above the height of the adjoining building and that there should be a uniform sliding scale of larger plants ending with, say, 150 ft. above the height of the adjoining buildings for plants consuming 1,000 T/day coal.

(*e*) *Compulsory Installation and Use of Measuring Devices.*

It is proposed :—

(i) That, after a suitable preparatory period, all new chimneys taking the flue gases from banks of boilers requiring on full load more than say 10 cwt. total per hour of coal or oil should be equipped with a photoelectric smoke density recorder and alarm, which must be kept in continuous commission when firing is in progress, and the charts for which must be available for inspection by the proposed Regional Smoke Control Officer.

Smoke which gives over 50% light obscuration on a 10ft. column might be considered offending and penalties should be enforceable against persistent offenders.

As improved methods of combustion in boiler furnaces are devised, this regulation might well be extended to still smaller industrial boilers and might be made more stringent for larger units installed after a given date.

(ii) That, when simpler and perhaps semi-automatic testing gear has been devised for dust, as suggested in a previous section, tests are made annually by the owner (under full load conditions and with normal fuel supply) of the dust concentration leaving every dust catcher installed on boiler plants consuming more than say 20 tons per hour of coal. If the plant has soot blowers, these must all be operated normally during the period of a test. The Smoke Control Officer should have power to demand that adjustments are made and the plant re-tested if it gives an exit dust concentration 20% higher than the previously recorded lowest figure under substantially the same operating conditions. He should have power also to demand further tests and adjustments up to a maximum of, say, 4 per year on each unit when he has reason to believe that increased amounts of dust are falling on to the neighbourhood from the chimneys receiving the flue gases from these dedusters.

The Smoke Control Officer should have power to demand that any test he requires is carried out within a week of receipt of his request subject to the proviso that not more than say two tests in a week are required to be made in any one boiler house.

(iii) That, after experience has been gained on the working of these regulations for boiler plants (and of suitable improvements made in the light of experience) similar regulations, modified to suit the case, should be gradually introduced by the Smoke Inspectorate for other industries, progress in regulation being always governed by progress in research and development of furnaces and devices which emit less smoke and dust to atmosphere.

(*f*) *Consideration of Individual Industries.*

(*i*) *Power Stations and Other Large Steam-Raising Plants.*

The smoke problem here should not be one of emission of dark coloured and sooty smoke but of emission of grit and especially of fine dust. All large steam production factories use water tube boilers with automatic stokers. The combustion chambers are designed to consume all the volatile constituents of the coal which produce unpleasant sooty smoke and the only excuse that can be offered for the production of this type of smoke from such installations is overloading. But with properly designed plant, provided with steam accumulators, even colliery boiler plants and steel rolling plants which are subject to frequent intermittent peak demands for steam can be made quite smokeless. There is, therefore, no reason why firm regulations should not be made penalizing the production of black or dark brown smoke by owners of certain scheduled plant brought into commission after a certain date, and similarly why unsuitable plant should not be banned or modified after it has reached a certain age, say 25 years.

There remains the nuisance arising from grit and dust, which is by no means negligible. A big step forward was taken just before the war when the Electricity Commissioners advised designers of new Public Utility Power Stations that the exit dust concentration discharged from new boiler plant should not contain more than 0.4 grains of dust per cubic foot of flue gas (reduced to N.T.P.) of which not more than 0.15 grs./ft.^{3} should be over 20 microns. (A 20 micron dust particle only settles at the rate of one inch per second in still air and the natural turbulence will therefore prevent its settlement within perhaps miles of a high chimney ; it is however carried down to ground by eddy diffusion). These dust concentrations are relatively high for a large Power Station and some design engineers are specifying exit dust concentrations as low as a total of about 0.15grs./ft.^{3} at N.T.P. for the most modern large Power Stations[11] fired with pulverized coal. There is, however, no evidence that the high standard of performance involved has been maintained over several years of running.

The great advantage of this voluntary regulation is that at last a move has been made away from the concept of percentage efficiency removal of dedusters (if installed). The concentration of dust passing forward with flue gases from a boiler fired with powdered coal may be ten times greater than that from a stoker fired boiler working at an easy grate rating, and thus 90% removal of dust in flue gases from a powdered fuel boiler would give worse conditions than only 50% removal of dust from the flue gases from many stoker fired boilers.

One weakness of the regulation as proposed is that it does not take into account the size of the installation. A plant burning 1,000 tons/day of coal and emitting 0.4 grs. of dust per cubic foot of gas discharges roughly 11 tons/day of dust into the atmosphere. If, therefore, this plant is doubled, the nuisance it causes to the neighbourhood is doubled even if the same high efficiency of dust extraction is maintained. Obviously the mammoth Power Station must spend on better dust extraction plant a portion of the economies obtained in concentration into such a large unit. (As an extreme case, this was demanded at the instigation of the London County Council when the Electricity Commissioners laid down regulations for both dust and sulphur dioxide removal from Battersea and Fulham Power Stations). Conversely, the relatively small unit should be allowed more latitude—but only up to the limit of well designed simple dust extration plant. Thus, whereas the small user can obtain a clean looking and substantially innocuous chimney discharge by the use of **properly run** simple cyclones, the large user of powdered coal must resort to more efficient means of dust removal such as electrostatic precipitators. Despite the difficulties, it should nevertheless be possible to frame regulations limiting the exit dust concentration from all groups of water tube boilers having a maximum burning capacity of over 100 T/day of coal to 0.4 grs./ft.^{3} of which not more than 0.15 grs./ft.^{3} may be over 20 microns in size, with the additional proviso that the total discharge of dust from any group of boilers under the same ownership and within a given area of so many acres shall not exceed, shall we say, 1,000 lbs./hr.

It is believed that design engineers would welcome guidance on these lines—this class of industry has always been willing to co-operate on reduction in atmospheric pollution but has wanted clear and practicable instructions which are fair to large and small units and fair to the population in the surrounding area.

(*ii*) *Small Boiler Plants, e.g., those using Shell Boilers.*

The small boiler plant in heavily industrialized areas such as Lancashire and the West Riding of Yorkshire is, after the domestic house, one of the worst sinners in polluting the atmosphere, particularly in the North and Midlands. The smoke is readily seen because high chimneys are used to provide the necessary natural draught. Probably 20% of the coal in the country is burnt under such conditions.

The hand fired boiler is the cause of most of the trouble—firemen can and should be trained, but much of the training is wasted because there is no automatic recorder to tell the fireman and his management when black or dark coloured smoke is emitted and for how long ; the temptation to bad firing by the lazy or very busy man therefore remains. There should be practical training accompanied by the bare essentials of theoretical training for the " hand-fireman " and employers and trade unions should be encouraged to work out an improved rate for men who pass courses approved by the Ministry of Fuel on hand-firing, with a points bonus for those who keep their chimney discharge below any limits set by the Smoke Control Inspectorate.

As regards further regulation, the first step should be to ensure that all new plants installed after a given date are reasonably smokeless except under condition of gross maloperation. No firing equipment can be completely fool-proof but just as the Motor Trade was compelled to fit both four wheel brakes and traffic indicators on all new vehicles after specified dates, so improved devices can be made compulsory in the "steam raising industry." Also clearer guidance should be given to Industry on the best practicable apparatus which can be installed to consume smoke as a clarification of the Public Health Act of 1936 which has never been worked properly for lack of definitions. Here are suggestions for first steps :—

(1) That after a suitable period of notice, all new boilers firing fuel of over 30% volatiles[12 (and Cf. 13)] and of rated capacity over 6,000 lbs./hour, should preferably have automatic smokeless stokers or otherwise be compulsorily fitted with a suitable device (see later) for smokeless combustion of a design which has been approved by the Smoke Control Inspectorate. This regulation should also apply to old boilers removed into any new position.

(2) That after a further period of notice, regulation (i) should be extended to all boilers of capacity over 3,000 lbs./hr. steam and to all boilers burning fuel of over 20% volatiles.

(3) That, after a still further period, regulations (1) and (2) should apply to any existing boilers less than 25 years old. (It would not be economic to alter older boilers).

(4) Any battery of five small boilers should come under the regulations for the next largest boilers.

(5) That, after a further specified period and subject to the development of suitable devices, all existing hand fired industrial boilers, of whatever size, are equipped with suitable additions (of a design approved by the Smoke Control Inspectorate) to render them more smokeless.

The effect of these regulations would be to increase thermal efficiencies and they would therefore be economically sound ; they would at the same time make a large visible improvement to the skies of industrial Britain though they would not reduce general dirt as much as would smokeless houses. The time periods fixed should not be too short for the manufacturers of equipment and for the further development of subsidiary smoke prevention devices ; then those manufacturers who make only hand firing equipment without adequate smokeless devices will deserve to lose business for not keeping abreast of modern developments. Equipment must, as already said, be suitable for the classes of coal available—during the war years Fuel Supply Officers have been known to allocate competely unsuitable coals even to stoker fired installations (e.g. fine coals to sprinkler grates designed for washed singles) and smoke and grit emission have been inevitable to the annoyance of the inhabitants and to the unnecessary worry of the factory management who had no control over the matter.

As regards the suitable device mentioned in (1), during the war the Fuel Research Station developed a modified firing door with automatic secondary air inlet for the prevention of black smoke from the boilers of coal fired ships. This has been claimed to be a great success and to be equally applicable to land boilers such as hand-fired Lancashire boilers It is regrettable that the Government did not publicize the device immediately the war ended in August 1945[14] and have it fitted as an example on at least one boiler in every large industrial town. Publicity by means of working examples is worth far more than paper propaganda, which in any case often fails to reach the people for whom it is written.

The small colliery boiler plant is usually responsible for an almost continuous banner of nearly black smoke. Often little is done about it because the colliery is in relatively open country and its smoke may in fact do most of its damage in the area of a different Local Authority. The excuse of the colliery is usually that it burns poor quality coal, such as middlings or washery slurry. Means for reasonably smokeless combustion of these classes of dirty and wet coal are fast improving, e.g. use of pulverized fuel firing (which is adaptable to all classes of dry coal) preceded by coal driers, if necessary, and followed by adequate dust catchers as discussed previously. Washery slurry would remain a difficult problem and sympathetic consideration and relaxation by Smoke Control Officers might be given for a time to plants which are burning this fuel, but the argument that smokeless combustion of any unsaleable colliery coal requires more expensive equipment must not be allowed to carry any weight as the fuel is correspondingly cheaper.

We may conclude this section by remarking that many new factories installed by or on Government account during the war, including all the Ordnance Factories (where entry of grit or soot into explosives could have dangerous results), were equipped with boilers, many of them small, which were so smokeless in operation that it was difficult to see from a few hundred yards distance whether the chimneys were discharging any flue gas. There can, therefore, be no arguments that small boilers cannot be made smokeless by installation of appropriate automatic stokers.

(*iii*) *Railways.*

The Railway Companies are already well aware[15] of the smoke nuisance from large marshalling yards and big engine sheds where numerous locomotives raise steam. The latter nuisance can be reduced by training of firemen coupled with suitable disciplinary measures for persistent offenders—difficult to enforce in these days of labour shortage, and at night.

The marshalling yard nuisance will probably soon be solved by the diesel or diesel-electric locomotive, which is in any case more economic

Regional Smoke Control Officers would undoubtedly be able to bring more effective pressure to bear on offending railway yards than can be done at present by Local Authority officials.

(iv) Oil-Burning Equipment.

A badly run oil fired boiler can produce a fouler sticky smoke particle than any coal fired boiler and yet the means for burning oil smokelessly are perfectly well known. Usually the smoke is produced for long periods because the boiler operator cannot see his chimney, often the installation is relatively small and is in the heart of a city, such as in an hotel.

The installation of smoke density recorders and alarms should be made compulsory. Thereafter heavy penalties for this nuisance should be rigorously enforced. In normal times those who can afford to burn oil can afford to take the necessary measures to prevent smoke from its combustion ; in the immediate future, large scale industry is being faced with having to install oil burning equipment owing to the shortage of coal. It is necessary that the Government should let it be known at once that slovenly installations which produce oily and sooty smoke will not be permitted to operate. It should be useless for the technically incompetent managements to say that they cannot help making a little smoke—the experience with thousands of oil burning installations in the U.S.A. proves that it can be helped as does the experience of the Navy and Merchant Navy.

(v) Gas Works and Coke Ovens.

Little need be said here since plants in good repair are relatively smokeless though old coke ovens are aften smoky due to leaky oven walls and oven doors. The Smoke Control Officers proposed would have just that engineering knowledge necessary to make sure that managements were really maintaining their plants in as good condition as possible.

As regards new plants, a recent improvement is the provision in modern coke oven batteries of two draw-off mains, which has the effect of reducing the smoke evolved when the ovens are charged with fresh coal. Smoke Control Officers should be able to report on all experimental work leading to improvements such as this and thereafter the installation of well tried arrangements could be made mandatory.

(vi) Iron and Steel Works including Engineering Works.

The main problem is that of the small works. Certain operations requiring a reducing atmosphere will always remain really dirty as long as they are performed with coal. The plant fired with hot coal producer gas made from high volatile coals will also give out very dirty smoke when the flues are cleaned by burning out the tar. The problem will remain until better methods of gasification of coal for this purpose are developed. In large works improvements have been made but in small works progress has been far too slow during the past twenty years and more intensive research on the subject is obviously required on the part of the manufacturers of steel furnace stokers and producers—otherwise they will find their business will go through the changeover to coke oven grid gas or to entirely new methods of gas production. A review of the problems is given in Reference 16.

The contribution of these industries to the total atmospheric impurity in the country is, except in a few districts, relatively small. Consequently it is better to leave the cleaning up of the industry to a date when more readily practicable means of abating its smoke nuisance have been evolved. Smoke Control Officers should be empowered to press for better methods, however, as they are fully developed.

A few blast furnace plants do, however, merit attention, namely those which burn or discharge blast furnace gas without removing the dust efficiently. Since the means of cleansing are known and the tonnage of dust is high, there is no reason why these plants should not be made to conform to the rules already suggested for the dust discharge from Power Stations and other large boiler plants and come under the jurisdiction of the Smoke Control Inspectorate.

(*vii*) *Clay Industries, in particular the Potteries.*

It would appear that, with the present state of technical development, some heavy smoke is bound to be discharged when firing many classes of clay, and it is useless to propose regulations forbiding the emission of smoke. The reasons for this perhaps pessimistic attitude lie partly in the fundamental chemistry and physics of the process. During the first period of firing, " the water smoking period," moisture must be evaporated off very slowly for many days to avoid cracking of the ware and the temperature in the kiln must be kept below 200-250°C. Even after this stage is completed, the temperature may still only be raised slowly to 600°C. during which time the chemically combined water is removed from the clay and some changes occur in the crystalline state of the constituents of some goods, especially silica goods. Thereafter, in the " Vitrification Stage " the temperature is raised more rapidly and up to 1,100°C. or even 1,400°C. for certain goods. But in this last stage, oxidising and hence smokeless conditions are not always permissible, and a strongly reducing atmosphere is required, e.g. in the finishing of blue bricks.

The intermittent kiln is a far greater smoke offender than the continuous kiln, and, in fact, the large tunnel kiln in which the goods pass through the kiln in trucks can be made practically smokeless in operation. Unfortunately this type of kiln is not suitable for a great many manufactures. Again, intermittent kilns can be fired smokelessly by producer gas or by coke in some of the stages of the operation, but the changeover to final firing by coal would not be a very practicable operation. It must always be remembered that, like the steel industry, this is a highly technical industry where the quality of the finished article is of the utmost importance and where conditions of firing for one product may be entirely different from those of another—fired in the same kiln. We shall also have to accept the fact that the Pottery Industry is situated in a soft coalfield where the coal has a high volatile content—a quality which is stated to be necessary for certain operations. An excellent summary of the problems is given in Reference 17.

Although the industry realizes the smoke nuisance it creates, it is doubtful if sufficient effort and money are being spent on large scale research and development of new types of kiln and grates for smokeless firing.

(*viii*) *Cement Industry.*

The Cement Industry was for many years the subject of complaint on account of dust nuisance from its chimneys. The dust discharge is somewhat similar to that from powdered fuel fired boilers. In 1906, the industry was placed under the Alkali Works, etc. Regulation Act and its smoke and dust problems therefore come under the Alkali Inspectorate. There is no need to say more than that the most modern dedusting plants installed by this industry have a high standard of efficiency and that there is evidence that the Chief Alkali Inspector and the Industry are always on the look-out for improved and cheaper apparatus to install on new or modernized plants.

(*ix*) *Lime-Burning Kilns.*

As in the Pottery Industry, it is essential to appreciate :—

(1) That the physical chemistry is extremely complicated. Lime is an essential in a great variety of the basic industries where the processes call for many grades, all of high chemical purity but having different physical characteristics.

(2) That the quality of the resultant product is, inter alia, a function of kiln temperatures, " burning " time, and quality of fuel.

Temperatures which are higher than the optimum are undesirable because, apart from the narrow margin between existing lime kiln temperatures and the critical temperature of existing refractories, such temperatures produce lime of a quality which is unsuitable for many markets, and, moreover, accentuates those differences in degree of burning associated with variation in the size of stone fed to the kiln.

(3) That the chemical change in a lime kiln takes place in an atmosphere containing a high percentage of carbon dioxide resulting from the disassociation of the limestone.

It will be clear, therefore, that the problem of smoke emission in lime burning is not merely a question of producing the most efficient combustion regardless of furnace temperature.

Material reductions in fuel consumption have been made in recent years in some of the more modern installations, and further advances in technique should undoubtedly result from present and future research work and the incorporation of the results in new plant. Nevertheless, even when a process have been evolved which satisfies all the exacting requirements as regards quality and dependability and simplicity of operation, there still remains the major question of extensive modification to, or replacement of, plant on existing sites.

(*x*) *Future Research and Development.*

As will be seen in the preceding sections, there are some industries where a substantial reduction in atmospheric pollution could be obtained by installation of equipment to give not more than a maximum specified discharge of smoke and dust measured in a prescribed manner[18]. But there are other industries where smokeless methods of operation using coal have not been devised and where alternative fuels either do not give the required quality of product or are grossly uneconomic.

Research on reduction of smoke from such processes is steadliy proceeding all over the world but there is the weakness that the full scale development and testing of the ideas arising from research lag far behind. The reason is that this type of development is not only far more expensive than small scale research but that it cannot be done in the premises of Research Associations or in most industrial research laboratories. A remedy might be found if the Government would co-opt small but strong working committees from the industries concerned with the responsibility of designing and building prototype full scale smokeless furnaces in works selected by the industry. The capital cost of these furnaces should be a charge on development, an agreed rent being paid by the firm on whose premises the furnace is built based on the capital cost of the alternative current design and rent being paid only when the furnace is producing material to correct specification and at design output. This type of development research might take ten years and would be expensive ; it is suggested that the money required for the ten years should be obtained in equal proportions from the Government and from the industry (e.g. by a levy in proportion to the quantity of soft coal used in non-approved equipment).

These committees should tackle the problems in the order of greatest volume of black smoke, and they should aim, as a first step, at reducing black to light brown smoke rather than colourless. From the results obtained, the Smoke Control Inspectorate and the industry in question should be able to draw up a list of approved equipment exempt from the levy and possibly a black list which should not be installed in any new works or extensions. In time, therefore, the atmosphere of these industrial districts will be improved. As it is to be expected that the smokeless equipment would give a higher overall thermal efficiency, there will also arise an economic incentive to replace old units by units less smoky in operation.

Discussions and Conclusions.

It will be observed in the foregoing sections (a) to (f) that an endeavour has been made to outline a set of regulations to which industrial engineers could operate without much extra expense. The proposals made are those of an industrialist and not of a lawyer ; no claim is made that they are water-tight nor all-embracing but it is believed that regulations phrased on these lines are easier to operate and easier to amend to give better results as technical discoveries and improvements come forward.

The author has not only rejected the proposals of the National Smoke Abatement Society to strengthen the hands of the Local Authorities through the medium of new byelaws : he has also suggested in effect that part of the Public Health Act should be re-written and then administered for the Ministry of Health by the Ministry of Fuel and Power on whose staff expert combustion engineers and other suitable technicians are already to be found. The weakness of the 1936 and previous Acts[18] is that there is no definition of " black smoke," no definition of the qualifications of an officer of a Local Authority authorised to decide when smoke is a nuisance and no body of technicians to tell offenders that there are better constructions of furnaces to consume smoke or better types of dust arrestors which constitute " best practicable means." It is not suggested that these matters should never be brought for decision to the Courts but it is felt that much injustice is done to the inhabitants in some areas because of absence of precise standards. There is also no intention to imply that the Ministry of Health should not concern itself any more with smoke nuisances—it should be at liberty to ask for remedial action by the Ministry of Fuel and its Officers.

No mention has been made of the millions of householders engaged in stoking their little fires ; yet according to the Leicester Survey[6] half the smoke in Great Britain is estimated to be of domestic origin. It is to be hoped that Simon's Report on " Domestic Fuel Policy "[19] will be implemented by the Ministry of Fuel and Power : this Report makes suggestions for the prohibition of manufacture and sale of appliances falling below approved standards and in this and other ways recommends somewhat similar proposals to those laid before you in this paper.

In conclusion the author would like to pay a tribute to the National Smoke Abatement Society which has now seen 47 years of honourable and successful service. It has played an important part in educating the public and has done valuable propaganda work. In this role it will continue to have the good-will and friendly support of Industry and it will be to their mutual advantage to study together how their common aims can best be achieved.

REFERENCES AND NOTES

1. Annual Report of the Secretary of Mines for 1938 but figures for domestic coal consumption taken from page 199 of Ref 3. Figures for cement consumption are calculated from cement production and the coal/cement ratio published in the Board of Trade Census of Production for 1935. The figures for the Pottery Industry are for 1935 in both cases, no other figures being available to the author at the time of writing.

2. Monthly Digest of Statistics, June 1946, published by the Central Statistical Office.

3. Heating and Ventilation of Dwellings—Post War Building Study No. 19 of Ministry of Works ; H.M.S.O. 1945.

4. Report by a Committee appointed by the Electricity Commissioners on " The Measures which have been taken in this Country and others to Obviate the Emission of Soot and Grit, etc. from the Chimneys of Electric Power Stations ; H.M.S.O. 1932.

5. G. E. McElroy and others " Dilution of Stack Effluents," U.S.A. Dept. of Interior,, Technical Paper 657 (1944).

6. Atmospheric Pollution in Leicester—A Scientific Survey: D.S.I.R. Atmospheric Pollution Research Technical Paper, No. 1; H.M.S.O. 1945.

7. J. L. Pearson, G. Nonhebel and P. H. N. Ulander "The Removal of Smoke and Acid Constituents from Flue Gases by a Non-Effluent Water Process," J.Inst. Fuel (1935) p.119, and J.Inst.El.Engrs. Vol. 77, p.1 (1935).

8. C. H. Bosanuet and J. L. Pearson "The Spread of Smoke and Gases from Chimneys," Trans.Farad.Soc. Vol. 32, p.1249, Aug. 1936.

9. F. Favell, "Considerations Concerning the Siting of Power Stations," J.Inst.El.Engrs. 1942, Part II, p.221.

10. H. L. Hohenleiten and E. F. Wolf, "Novel Tests for Stack Height," Combustion, Jan. 1942, p.38.

11. Compare evidence given at enquiry by Ministry of Works and Electricity Commissioners into the proposal to erect a Power Station at Kepier near Durham, where the plant was to give an exit of 0.1 grs./ft.^{3} at 132°C. or 0.14 grs./ft.^{3} at 0°C.

    See also description of extensions to Hams Hall Power Station (Birmingham Corporation), Engineering Vol. 145, p.212 (1938), where the specified exit dust concentration from new electrostatic precipitators was 0.10 grs./ft.^{3} at 155°C. or 0.16 grs./ft.^{3} at N.T.P.

12. Coal Survey Paper No. 58 (H.M.S.O. 1946) classifies coals as low volatile (less than 20%), medium volaitle (20-30%), and high volatile (over 30% volatiles). The information on the suitability of any coal under such a regulation is therefore readily available.

13. Manual of Ordinances and Requirements in the Interest of Smoke Elimination and fuel Combustion—papers read to 34th Annual Convention of the Smoke Prevention Association of U.S.A.; Chicago 1940.

14. Mention of the device was apparently first made in the Institute of Fuel for February 1946, p.111—Eng. Vice-Admiral J. Kingcome "Fuel Problems in War Time in the Royal Navy," but no description was given.

15. M. G. Bennett "Railway Smoke," Institute of Fuel 1945.

16. H. C. Armstrong "Modern Methods of Dealing with Smoke Prevention Problem in the Iron and Steel Industry"—Proceedings of National Smoke Abatement Conference, October, 1936.

17. E. Rowden and A. T. Green "The Problems of Smoke Emission in the Heavy Clay Industry"—Proc. of National Smoke Abatement Conference, October 1936.

    E. Rowden, W. Noble and A. T. Green "Smoke Abatement in the Clay Industries," Inst. of Fuel 1945.

18. See summaries of these acts in "The Law of Smoke Nuisances" by W. R. Hornby Steer, published by National Smoke Abatement Society, 1938.

19. Domestic Fuel Policy—Report by Fuel and Power Advisory Council; H.M.S.O. 1946.

DISCUSSION

H. G. Clinch (West Ham) said that he was pleased that the economical aspect of smoke abatement had been so strongly stressed in the papers. It had been his experience that usually the boiler house involved more expenditure than anywhere else in the factory, yet even to-day it was the one place where no balance sheet was called for, at any rate, so far as the smaller installations were concerned. When results were required they were usually on the wrong basis. The owners merely wanted to know the evaporation of how many pounds of water per pound of coal, whereas, of course, they should ask how many pounds of water per pound of money expenditure—which was a different matter altogether and was the true test of efficient working. He wished to correct his friend. Mr. Humphrey, when he implied that friendly co-operation with industry and the reliance of industry for friendly advice, and the safeguarding of trade secrets could only be achieved by an officer appointed by a Government Department. Mr. Clinch said that this was nonsense. He had, in his experience, achieved just that state of affairs when he was engaged in the West Riding of Yorkshire, and owing to the economies in working achieved, industrialists were very pleased indeed to see him at their works, He challenged Mr. Humphrey to quote a single case in the whole of the history of Local Government in this country where trade secrets had been divulged by a Local Government Officer. He said such a thing was never discussed because it was unheard of. Mr. Clinch emphasized that the Ministry of Fuel had their proper place in the scheme of things. They could collate information from the Research Departments of all the various industries, but having done so, should then be approachable by the officers of local authorities, and stop this "taboo" whereby officers must not communicate with a Government Department except by resolution of his Authority and through the Town Clerk. He said that quite frankly he had studied combustion and the working of steam boilers all his life and did not know the subject and he would not boast as an authority on all branches of combustion engineering, nor, if he had any sense at all would the man at the Ministry of Fuel. Nevertheless, a team of men could between them be able to assist.

Dr. R. Lessing (Member) said that Mr. Humphrey with his usual thoroughness had given a correct and succinct account of the industrial smoke problem. Mr. Humphrey would forgive him if he could not agree with his plea for a National Smoke Inspectorate. He yielded to none in his admiration of the work done by the Alkali Inspector's Department. It might well serve as a model of beneficent Government control, but here the analogy ended, for it dealt with a limited section of industry and, being staffed by a few dozen experts, could be controlled with an efficiency which could not possibly be achieved with a staff running into hundreds or even thousands. By all means let common standards be worked out, but keep local control on what was a local nuisance. Regarding standards, he felt compelled to defend B.S.893. It might appear complicated, but dealing with a complex problem, this could not be avoided. The Committee responsible for its production had resumed its work, and was actively engaged on its revision in the light of the experience gained, and of present and future requirements. Dr. Lessing's main point in dealing with Mr. Humphrey's paper was to reiterate his conviction that the smoke problem could only be solved by tackling it at the source. In his paper read at the Bristol Conference, 1935, he had traced the sources of atmospheric pollution. Smoke of the old type, consisting of tarry smuts, formed a negligible part of the present-day emission from factory chimneys. The visible matter in it consisted of ash dust and small coke particles, the bulk of which was derived from fine dust in coal. This was lifted from the fire-bed and carried to the flues and chimney. coked but largely uncombusted. of the 10 million tons of this dust (passing a 60 B.S. mesh screen) contained in the annual coal production, something of the order of one million tons appeared as visible chimney emission. Take out this dust at the colliery, use it in pulverized fuel furnaces, and the major problem which confronted them to-day was solved.

The Society should attack the problem at that end, and press for the elimination from the coal supplied, of the root cause of the evil. He was sure Mr. Humphrey, an old coal cleaning colleague of his, would agree with this proposition, in preference to "passing the buck" to a neighbouring area by building high chimneys or creating smokeless zones. Pending the time needed to put this proposal for prevention into effect, it would be for the authorities to insist on the best practicable means of a curative nature to be used, by way of the installation of grit arresting plant and competent boiler management, to eliminate the offending matter which should never have reached the firegrate. That this could be done with 100 per cent. efficiency was shown by the examples of Fulham and Battersea power stations. Moreover, these plants accomplished the solution of sulphur acids. Whilst smoke, grit and dust must be definitely regarded as an abominable nuisance, the sulphur acids. though invisible, were the insidious enemy which caused the real damage usually ascribed to smoke.

James Law (Sheffield, Rotherham and District Commitee) said he was supporting the proposals for new industrial legislation. In 1945, an Installations Sub-Committee of the Society's Council was formed and the result of their deliberations was the draft regulations they were now considering. Mr. Duguid's paper was a concise masterly effort, summing up what has been aimed at—correct design, adequate maintenance, and proper manipulation. He stated that the proposals were far-reaching and drastic, but they were practical and there was nothing contained in them that went beyond the bounds of technical possibility.

Mr. Farquharson had some doubt with regard to the provisions coming within the purview of Section No. 104 of the Public Health Act. If the emission of smoke from new buildings was to be controlled, the only way of doing it was in the manner specified—design, maintenance, and manipulation. Mr. Farquharson then openly disagreed with the licensing of furnacemen and firemen to operate these registered installations, yet he must know as well as all Inspectors that the best designed and maintained combustion plant in the world could be as bad as any other if handled with lack of care, or lack of understanding. Mr. Farquharson thought that the suspending of a licence was going to prove a hardship, yet as a certified engineer who had control of hundreds of firemen, he must appreciate that from a point of view of sobriety alone, apart from working ability, that method of registration would eliminate certain undesirables. His point regarding the lack of provision for "trainees" was one that may need a "time factor" adding. The licensing of men could be made to operate twelve months after the operation of the byelaws, to enable men to take their training and certificates. As an alternative licences could be granted to all men making application, who could show that they had had some experience with the plant being operated. The licence was operative for three years and that should be a good probationary period.

Mr. Bowles's only objection appeared to be that the stoker's job should be graded with an attractive rate of pay. Did he not realize that this was the "Fireman's Charter." and gave the men an opportunity they have never had before of demanding better rates of pay and better conditions? It would definitely grade firemen and furnacemen as "craftsmen." And lastly, he wanted to say something about the industrialist's point of view. It was one of the most remarkable papers he had had the privilege of reading, but as a practicable workable solution to smoke nuisance, it showed a lack of understanding of existing conditions in industrial areas, that was almost unbelievable. Mr. Humphrey stated that "industry has been the chief contributor to the solution of the smoke abatement problem." he would reply by stating that industry always had been and still was the principle contributor to atmospheric pollution, which was not caused by a small and backward minority but by some of the largest consumers of fuel in the country. He would quote electricity undertakings and the concentrated emissions of dust and sulphur that were continuous. If smoke abatement methods could show added efficiency the industrialist was interested, but if there was no return for the expenditure, little interest was shown. Mr. Humphrey stated that the Public Health Act had neither defined "black smoke" or the "best practicable means" and that no Smoke Inspector could work efficiently with such ambiguous phraseology, nor could the designer of new plant. He had been a combustion engineer and a Smoke Inspector for 36 years, and though he admitted that the Public Health Act was not all that was desirable—the men who made the Act had been dead many years, he suspected—if it was used with tact and common sense, and people would co-operate, there was no difficulty to overcome. Mr. Humphrey then asked that photo-electric cells should be fitted to all chimneys. In the area which he controlled there were about 3.900 chimneys serving 850 boiler houses and about 4,500 metallurgical furnaces. Half the boilers were not even housed, very few of them had any means of measuring the amount of water evaporated or the fuel used, and flue gas recording was non-existent. Metallurgical process chimneys in many places were about the same, so there was plenty of more essential recording necessary before they came to precision smoke measurement. Certain firms in the area fitted photo-electric cells prior to the war but owing to lack of servicing, they had fallen into disrepair and disuse. He was in entire agreement with Mr. Humphrey regarding the appointment of Smoke Control Officers, but why should they be attached to the Ministry of Fuel and Power? They should be employed by local authorities who were dealing with future planning and development and who had a better knowledge of local needs and requirements. Without wishing to be personal in any way, Officers working as Regional Engineers appeared to have spent most of their efforts in coercing people to use low grade fuels, irrespective of the type of furnace or boiler in use or the demands made upon it. There had been a serious lack of discrimination over this problem, efficiency, suitability and smoke emission being completely ignored. He was amazed that Mr. Humphrey thought that "smokeless zones" were no real solution to the problem, for if such areas were not agreed upon in the industrial areas, **where did smoke abatement commence?** Why should industry be opposed to the Prior Approval of heating plant? If the type selected was good, and there were many proved methods that were of advantage, they could be passed on to the person installing new plant. One of the difficulties in the past had been the lack of uniformity and the lack of interchange of ideas and methods. In the larger cities a system of prior approval had been in operation for some time with mutual advantage to all concerned. The height of chimneys had always been a vexed question and would remain so. Large power stations very often were the worst offenders—a journey from London to the North would soon convince anyone of that—where the chimneys of almost every electricity station were barely higher than the top of the building and certainly not 50 per cent. higher. Dealing with gas works and coke ovens, Mr. Humphrey stated that these were "relatively smokeless." Anyone who had lived in close proximity to a coke oven plant would take strong exception to that statement. They had eleven coke oven plants in their area and it was safe to state that they caused more atmospheric pollution than any other heating plant; "green gas" from the recharging and sulphur and dust-laden vapour from the quenching towers was almost continuous. The Alkali Inspectors would not take any action about these principle causes of nuisance. He was afraid Mr. Humphrey was sadly out of date about steelworks' practice. About fifty million cubic feet per day of gas was used, which represented probably about 15 per cent. of the total fuel demand. They hadn't any more gas nor are they likely to get any and other fuels would have to be substituted for the purpose. Provided that suitable appliances were installed metallurgical furnaces could all control their smoke emission, irrespective of the type of fuel used, though gaseous fuel was preferable for heat treatment and low temperature working. Now was the time for cleaning up when many of the furnaces in the area were about to be renewed after their war-work. Some of the larger works had shown remarkable results in this matter, but there was still an amount to be done. He would refer Mr. Humphrey to a paper given by Dr. Fells at Doncaster last April for the Society and the Institute of Fuel.

Mr. Humphrey, concluding, stated that he had rejected the proposals of the National Smoke Abatement Society and substituted his own, very politely suggesting that Local Authorities should hand over their duties to the Ministry of Fuel and Power for further working. Did Mr. Humphrey know that the sub-committee that framed these byelaws were competent engineers with years of boiler-house practice and practical experience behind them? Did he also know that in their large industrial cities, smoke abatement work was carried out by qualified engineers — Birmingham, Liverpool, Glasgow, Sheffield and Leeds? The Public Health Act, 1936, gave local authorities powers to make byelaws respecting new buildings: they wanted those byelaws now whilst reconstruction was going forward, not years hence as Mr. Humphrey suggested, when they had "missed the boat." At the moment the Ministry of Fuel and Power had enough troubles of their own to overcome without usurping other people's work about which they had little or no knowledge.

Dr. A. C. Monkhouse (Fuel Research D.S.I.R.) said that Mr. Humphrey had referred in his paper to the modified firing door developed at the Fuel Research Station for the elimination of smoke from the boilers of coal-fired ships This device was developed during the war and fitted to over a thousand ships. Its object was to prevent ships in convoy giving away their position by the smoke trail from their funnels. Considerable instruction was given in the operation of the smoke eliminators by means of films, lectures and demonstrations to stokers. It had been shown at the Fuel Research Station that when smoke emission was reduced, there was a decrease in fuel consumption. The saving in fuel could be as much as 10 per cent. in extreme cases, where black smoke was emitted. Recently members of the Fuel Research staff had carried out boiler tests at sea under ocean-going conditions, and had shown by the use of smoke eliminators a saving in fuel of 5 per cent. The report of this trial was in the hands of the printers, and would be obtainable through H.M. Stationery Office. The loss of heat when smoke was emitted was due mainly to the invisible combustible gases — carbon monoxide, hydrogen, and methane. The loss due to these gases was three times the loss due to the visible smoke. The same principle as used in the marine boilers had been applied to a hand-fired Lancashire boiler, at the Fuel Research Station. Many demonstrations had been given, and the system was now being tried out in boilers in industrial use. A paper describing the system would appear in the next issue of the "Fuel Economy Review."

Councillor Mrs. A. E. Prendergast (Dagenham) spoke on the subject not only as Chairman of the Health Services Committee of the Dagenham Borough Council, but as the wife of a stoker. There was no doubt that the need for considerable improvement in the working conditions and wages of these men was urgent and long overdue. Their work was skilled and should be paid for as such; they would then attract the right type of man to the job. Training was essential—but was this to be done in the man's own time? Surely the only reasonable method in these days was for the employer to grant facilities for training during working hours. As for the licensing of stokers, she was confident the men themselves would very strongly oppose such a measure and would support their objection. That method would certainly restrict the liberty of the individual and tend to the regimentation of a certain section of workers. Register the plant by all means and thus ensure that the installation was suitable in all respects, and ensure that the human element was suitable by proper training, improved working conditions and rates of pay.

Councillor E. A. Smewin, J.P. (Oxford) said that he did not think that our proposals would go far enough as he wanted something done to deal with the present nuisance of industrial chimneys He stated that when they called in an expert regarding the nuisance from their Municipal Electricity Works, which was situated in the midst of a densely populated area, they were told that a chimney 350 feet high was needed but that the Electricity Commissioners would not allow it to be built. Since last April they had been sent by the Ministry of Fuel and Power 29 different grades of coal, including several lots of outcrop coals, and that as a result the stokers did not know how to fire the furnaces to prevent the emission of smoke.

Councillor J. Duffus (Bexley) commented upon the name of the Society, suggesting "Anti-Atmospheric Pollution Society" because there were many atmospheric problems which could be tackled which, at the moment were not covered by their present name and constitution. He then quoted the need for new industrial legislation to prevent cement kiln grit, plaster board dust and asbestos dust being disseminated over industrial and other areas.

G. W. Farquharson, replying to the discussion, said that as most criticism appeared to be directed towards his statement concerning the licensing of the person who fire or operated the boiler or furnace, registered under paragraph 11 of the New Proposals, he again said that he was convinced that such a form of licensing would not be helpful to the cause of smoke abatement. One could not draw the same analogy between a registered plumber or a certified engineer or doctor. As he read these proposals, and one must include paragraphs 11, 12 and 13, the fireman or furnace man could only be licensed for the type on which he had experience ; therefore it restricted his mode of livelihood. For example, how could one licence a furnace man on a brick kiln to include hand firing on a water tube boiler ? Finally, although examples, such as licensing of slaughtermen and milk premises, etc., had been quoted, he believed it could only be accomplished by an Act of Parliament and not by any byelaws.

Mr. H. A. Humphrey, replying to the discussion, regretted that there had been no technical discussion of his paper. No facts, figures or arguments contained in the paper had been challenged and therefore no technical reply was required. A good many speakers contended that the administration of any future legislation on smoke abatement should be administered by local authorities. This was natural since all local authorities throughout the country were invited to be represented at the Conference, but no speaker developed any logical argument to support this view. Dr. Lessing was in favour of administration by local authorities but he held the view that it was proper for such authorities to call upon independent consulting engineers to advise them on the matters concerned, so that local smoke inspectors were relieved of their responsibility for technical decisions. The author believed that this view would not be upheld by many local authorities nor did he think it would tend to uniformity of technical standards even for the same industries in adjacent areas. The author hoped by his paper to provoke a discussion on the technical and practical proposals he had presented. Instead there was a simple disagreement with his conclusion that the only practical and efficient scheme must be based on legislation which provided standards, tests, and approval of appliances at a high level, and administered centrally under the Ministry of Fuel and Power. A simple denial of this did not carry the matter any further so that the only result of the Conference was to establish the fact that there was a decided difference of opinion. The merits of the different proposals had therefore still to be elucidated.

THIRD SESSION

Saturday Morning, 26th October, at 9.30 a.m.

Chairman : **Alderman J. Talbot Nanson**
(Chairman, Publicity Committee, Brighton)

WHAT OF THE FUTURE ?

By Charles Gandy.

War on smoke has to-day reached a stage which may be compared with that in the recent war just before the opening of the Second Front. " I doubt," said Mr. Clough Williams-Ellis at our 1943 Conference, " whether there is any reform so generally recognized as necessary and that would yield such immense and immediate improvement in return for a short, sharp and determined Blitz, as that against our centuries-old oppressor, Smoke." Till very recently such a Blitz was almost inconceivable. The Central Government seemed content with a " phoney " war. Local Health Authorities, keenest for the attack, fought with one hand tied, their only weapons those from the Public Health Act, 1875, powerless against the massed output of smoke from tens of thousands of offices and commercial buildings and over 12 million homes. Such smoke has even in recent years, enormously extended the territory it holds in unchallenged occupation. We are about to open our attack on this occupied territory. Let us therefore examine the positions we have so far reached, and from which our further campaign must move forward.

Where We Stand.

In the first place, there is now no city or town of consequence in the the country whose Health Authorities do not regard the elimination of smoke as essential to public health. The responsible words of Dr. Veitch Clark (late M.O.H. Manchester), " The abolition of smoke from our midst would do as much for the improvement of public an individual health in our industrial centres as any other single action open to this country "—and of Dr. Johnstone Jervis (M.O.H. Leeds), " In permitting the pollution of the air we are doing a disservice to our own generation, and inflicting a handicap on future generations," are echoed with ever-increasing emphasis by every Medical Officer of Health throughout the land. At this Conference in Brighton, Medical Officers, Chairmen and members of Health Committees, health inspectors from all our great centres of population, have united in their hundreds to demand that the fight should move forward. Behind them are the millions of ordinary citizens who have learnt to believe that victory is in sight, and that the dirt and drudgery associated with life in cities will soon be a memory of the past. More and more the newspapers of the country are giving voice to this same hope—and in the many important journals concerned with municipal and technical progress increasing space is found for a matter freely recognised as of topical and essential importance. The country is ready for the great attack to begin in earnest. Where then are the preparations for it ? Where the central organization and driving force which should be behind it all ? At present, it is not as one might have hoped the Government, but the National Smoke Abatement Society alone which is the connecting centre for this nation-wide resolve to have done with a nation-wide evil. The Society's powers are limited—it can help to instruct and educate public opinion—it can encourage action by its local authority members under their existing powers, and advance suggestions for enlarging those powers. It is the Authorities themselves who are the front line of the battle. Parliament alone can provide the new powers they need and the responsibility for the direction of operations lies and must increasingly lie with the Central Government.

Challenge and Opportunity.

The reasons which, apart from the educational work which has been carried on, have made the present time of challenge and opportunity are well known, ,and may be summarised :—

(1) It has become apparent that an optimum use of our fuel resources is essential in the public interest, and the whole fuel industry is coming under public control for that purpose.

(2) Technical advances in respect both of fuel burning installations and appliances and of the production of smokeless fuels are such that a rapid change to smokeless methods in factory and home has become generally possible with advantages for all concerned, in efficiency, economy and comfort.

(3) Millions of our younger people returning from war service to homes and places of work darkened and degraded by smoke demand, rightly, something better.

(4) There are thousands of acres of war damaged areas in which it should be criminal to erect any but smokeless buildings.

(5) Most larger local authorities have prepared or are preparing plans for the whole of their areas. Such planning is impossible without taking into account the extent to which the concentration and drift of smoke will be overcome. In fact, most of the plans anticipate complete or almost complete smokelessness.

(6) It is generally realized that the unplanned drift into the countryside of those who can afford homes away from the smoke of cities must be stopped.

(7) Methods, for which this Society is largely responsible, have been devised for the progressive removal of the causes of smoke and the clearing away of its effects.

The Obstacles.

The causes which, in spite of the urgency above indicated, hold up the advance, are also well-known, and mainly the result of antiquated legal and administrative machinery and inadequate staff work, particularly at the centre :—

(1) There is no "second front"—i.e. against smoke of commercial or domestic sources. The work is carried on by local health departments even on the old industrial front with inadequate powers, and

either little encouragement or sometimes active discouragement from the Ministry of Health, which should be the operational Headquarters of the campaign.

(2) The enemy is allowed to become well entrenched, i.e. by the instalation of unsuitable appliances, before the authority can move.

(3) No effective co-ordination of smoke control operations.

(4) No effective fuel policy.

(5) No sufficient training of essential personnel.

(6) No "Ministry of Supply" to ensure rapid production and delivery of up-to-date appliances.

(7) No information service to rouse and maintain public interest and effort.

The Remedies.

The remedies for these faults have been devised and only wait the necessary legislation and Government action :—

(1) *Smokeless Zones.* Extension of the powers of local authorities enabling them to set up smokeless zones as bridgeheads in the "second front" assault—that against non-industrial smoke emission. The smokeless zone clause of the Manchester Act 1946, a Manchester "Mulberry" for this second front, has been launched and towed into position. It is now up to the Government to extend similar legislation to all authorities. If we really mean action on both fronts, domestic as well as industrial, the creation of smokeless zones is not merely the best method—it is the **only** method. It would be impossible to frame any legislation immediately and universally applicable to control the smoke which now pours from countless chimney stacks, from offices and commercial premises, hotels, even from publicly owned municipal buildings, as well as from domestic premises spread over hundreds of square miles. No police force or inspectorate could deal with such a problem. The only plan is to take it piecemeal—progressively—clearing the ground as we go—getting one area after another free of the nuisance, until the whole process can be speeded up when productive capacity and adequate distribution of fuel and appliances are ready to meet up-to-date requirements in all areas.

(2) *Prior Approval.* Legislation is also needed to give local and regional authorities power to secure that all fuel burning installations shall be subject to prior approval. I will not enlarge on this subject which the Conference has already discussed.

(3) *National and Regional Smoke Control.* The Government must give a definite lead in regard to the setting up everywhere of regional smoke authorities with statutory powers and duties. Without superseding similar functions exercisable by the larger local authorities, these might include the employment of an adequate staff of expert fuel consultants and inspectors, arrangements for prior approval of installations including standard domestic appliances, the taking of observations throughout the region and relating the same to those in adjoining regions, the collection and dissemination of air pollution statistics, progress reports,

and information, for the guidance of the Central Government and of constituent authorities, for the use of special classes of fuel users, and for the general public, and arranging for the training of smoke control personnel and the training and certification of stokers. Such regional committees should have their own offices and permanent officials but should be democratically controlled by representatives from the constituent authorities and work in co-operation with their health and smoke control departments. The whole country should be covered by such regional control, each of the several main concentrations of industry and population in various parts of the country being so far as possible included in a separate region.

(4) *National and Regional Fuel Control.* There must be what Dr. Lessing has called the "rational preparation" of coal for the various uses to which it is to be put. At present only about one half the coal used is washed. There must be a system of distribution organized in its broader lines nationally, but regionally and locally flexible, and ultimately in the hands of those in close touch with actual requirements. In particular the marketing of solid smokeless fuel for domestic use needs careful attention. And this regionally based and locally administered fuel organisation must be brought to work in co-ordination with the regionally based smoke control organization.

(5) *Training of Personnel.* This falls into two parts:—

(a) The proper regional organization of smoke control under statutory boards will demand the service of many highly trained consultants, inspectors and others with expert knowledge both of fuels and appliances, able to suggest, recommend and approve the best available installation for any particular purpose, and indicate the fuel available and best suited for the installation when working. Expert supervision is required not only to prevent unsuitable installations but to ensure that the best use is made of existing plant. It is instructive to refer to a survey recently carried out in New York. Of 2,200 small power plants surveyed, only 8 were found in first class operating condition, 15 per cent. had minor defects but were well operated, while two-thirds of the plants had operational difficulties, with incorrect firing heading the list. Only about 25 per cent. of combustion control and metering equipment was being operated properly. Many instruments were disconnected or couldn't be read. There was lack of co-operation between boiler-room and steam-using departments. Manufacturers would be assisted in keeping all these faults in check by the co-operation of experts from the regional and local smoke control authority working with the fuel administration.

(b) The actual training and certification of stokers and furnace men whether for hand fired or mechanically controlled installations. for fuel economy and smokeless operation it is essential that these services should be performed by skilled workers with pay corresponding to their qualifications.

Technical and scientific courses both for inspectors and operatives, with diplomas and certificates for proficiency, must be arranged in Technical Colleges or other suitable institutions and combined with practical experience.

(6) *The Mass Production of Appliances.* In spite of the pressing need for fuel economy and the urgent importance of providing tenants of all new houses with up to date fireplaces which will give pleasing results with smokeless fuel, we hear with dismay that appliances of obsolete pattern are still being produced and supplied to Housing Authorities, on the pretext that the completion of houses cannot be delayed until the new grates are ready. That this should be the case more than two years after the Housing Manual of 1944 had urgently recommended that the new types only should be used in all new housing shows an inexcusable lack of co-ordination between responsible Government Departments, and markes one wonder whether the old type of departmental official, overworked, timid, and nervously apprehensive of disturbing supposed vested interests, is not still in the ascendant. A firm declaration of Government policy in this matter coupled with the determination to allocate the required materials would have avoided the trouble and it may be hoped that it is still not too late for proper action to be taken.

(7) *A Government-sponsored Educational Campaign.* It seems strange that the Ministry of Health, which has been able to secure the expenditure of so much public money in publicity campaigns affecting other matters, continues almost speechless in a matter which Local Health Departments consider so fundamental to the health and well-being of the community. The apparatus for an extensive campaign of publicity is ready to hand in the knowledge and experience gained through many years of research and educational work by the Society, but millions of our fellow citizens are still in ignorance not only of the damage caused to themselves and others by their own unconscious contribution to the smoke nuisance, but also of the steps which they might quite simply take to avoid making such a contribution. The smoke polluted condition of the air of our cities is regarded as something natural and from which there is no escape but in getting away from them. As anyone who moved through the Manchester Art Gallery when the Manchester Plan for a completely smokeless city was being shown must have noticed, there was a surging undercurrent of enthusiasm which could easily be turned to account. If people are shown not only that smokeless cities are possible, but that with a slight change in some of our habits they are in fact now attainable the degree of public support for the necessary regulations can be enormously increased. Again it is for the Government to make a plain declaration of policy and to back it up by suitable publicity.

Signs of Repentance.

Some may think the picture I have drawn of Government indifference to a matter of such far reaching importance too black—or at least unfair to those now taking charge of the Departments most concerned. Fortunately we must admit a recent change for the better. Apart from individual pronouncements this was first noticeable in the *Housing Manual* 1944, published jointly by the Ministry of Health and Ministry of Works, which after recognizing the present " widespread demand that the evil of atmospheric pollution shall be resolutely attacked " added that " the Government attach particular importance to smoke abatement in view of the injury to health and to general amenities caused by atmospheric pollution " and referred to the extra labour for the housewife as " another evil result which must not be overlooked." This has been followed by the Report on Domestic Fuel Policy by the Fuel and Power Advisory Council presented in March this year, by far the most important document relating to smoke abatement yet published by any Government. The Council under the Chairmanship of Sir Ernest Simon gave its weighty support to policies urged by us, recommending in particular Government action for increasing supplies of smokeless fuels and up-to-date domestic heating appliances, and the setting up of smokeless zones as a first experiment towards obtaining control of smoke emission from all sources.

Effect of Smoke on Agricultural Productivity.

There are two further aspects of the smoke evil to which I think insufficient attention has yet been given by the Government or by others most concerned. One is the effect of smoke and the smoke cloud on agricultural productivity. The growth of the smoke cloud over our coutryside has been so gradual that we easily think of it as a natural climatic condition. Besides the damaging effect of falling soot and acid extending far outside the smoke producing areas and causing an average annual deposit of not less than 10 tons per square mile in rural districts, it is now estimated that 2 out of the 3 million tons of smoke pollution emitted in solid form is in so fine a state as not to descend by gravity. Carried upwards to the lowest temperature inversion, often near the stratosphere at a height of some 33,000 feet, some 40,000 tons of this " air flotsam " is usually hovering over the whole country, cutting off a high percentage of available light, especially in those climatic conditions when maximum light is needed for plant growth. The overall loss in agricultural productivity, including that of market gardens and allotments, has been estimated at as much as between 20 per cent. and 30 per cent. It is hoped that Agricultural Research Stations will in the near future make a closer study of these effects, and that Farmers and Allotment Holders' Associations will give the matter the attention it deserves.

On Social Discontents.

The other aspect of which I speak is an aspect which one wishes could be forced on the attention of the Government. As Sir John Martin Harvey wisely put it " The lack of beauty in the lives of the people, so poignantly felt but so inarticulate, the lack of that comeliness in their surroundings which has so civilizing an effect upon the character, is ignored by Governments, and is largely the cause of social discontents." A sense of " frustration " is widespread. The average citizen does not live in the political atmosphere of Whitehall. He is not cheered, or depressed, by balance sheets or blue books. He comes home—if lucky—to a house or flat tolerable enough if it and the whole neighbourhood he and his family must live in had not taken on the monotonous dinginess of the smoke-sodden town of which it is part. He is depressed by the semi-darkness of it—his wife tired by the endless housework of which he feels she would have so much less in a better neighbourhood. Perhaps it is much the same where he works. Soon his one idea is to get away to something better. The impulse to improve one's environment is normal—if frustrated, it is superseded by the restless impulse to get away from one's environment. The former impulse expresses itself in work, the latter in the mere desire to make money enough to buy what others cannot afford.

The individual inhabitant can do little to improve the surroundings of his home—practically nothing about the atmosphere in which it is buried. If "they," i.e. the Government and responsible authorities, do nothing, is it surprising that he joins in the demand for a better wage ?—if only that he and his family may get away, like everyone else who can afford it, into happier surroundings and a fuller life. No amenities are more economical to purchase—more worth while—than those purchased for the common enjoyment of a whole community—but the most fundamental amenity, which should cost nothing, is freedom to enjoy fresh air, clear daylight and clean, healthy surroundings. These should not be confined to the outskirts of our towns—they must be brought to the centre of them.

Let the Government give the lead we ask, let the necessary laws be passed to enable the Local Authorities to carry their smoke campaign to the "second front"—and we shall not stop until we hit the Giant Squalor for six and have him and all his sooty Luftwaffe in the bag. We shall no longer look with envy at the pictures of clean and beautiful cities abroad. "Britain Can Make It".

Clean the Buildings.

As the central areas or other parts of cities are progressively cleared of smoke emission, is it too much to hope that the old and grimy buildings remaining in them should be cleaned outside ? In some cities abroad this is regularly enforced by law at intervals of eight or ten years. In that way our towns will be pleasanter and more attractive places both for their own citizens and for business and other visitors—and the advantages of smoke prevention will be more apparent. Perhaps in some cases—e.g. a Cathedral or other building of special public interest the cost or part of the cost of cleaning could be borne by the public.

The Society.

Something now about the future of our own Society. The new Constitution is working well—and the first Divisional Council—in the N.W. Division has been set up. The coming year should see the setting up of several more such Divisional Councils—and we hope a very great increase in membership, following local activities. There are many more local authorities to come in—the advantages of membership are perhaps most obvious in their case. We must make membership as attractive as possible to individuals. They are already kept in touch with smoke abatement progress through "Smokeless Air" and other publications. We may suggest, now that the paper shortage is less acute, that they should be put on the mailing list of manufacturers of smokeless fuels and appliances—and possibly receive some preference as customers. Could some of our influential members who are in a position to do so, gas and electricity undertakings for instance, assist our membership drive by displaying the Society's poster giving membership particulars and having available forms of enrolment, and possibly even by allowing enrolment of members of the Society to be made at their offices, and the names and subscriptions pasesd on to Divisional Treasurers or to Chandos House. The Society is resuming and will soon be intensifying its propagandist activity—and Divisional organizations can be of the utmost value in this—arranging lectures and exhibitions in their areas, meetings of our own members in the division and joint meetings with other interested societies, encouraging smoke abatement teaching in schools, collecting and reporting information concerning local progress and complaints of particular smoke nuisances, and enlisting the co-operation of the local press. An important matter for divisions is the choice of a good secretary who can be relied on to maintain initiative in the Division and provide an office, thus relieving the burden in this respect on the General Secretary and central office of the Society. The Division is in fact simply the Society itself operating in a particular area. Its members, its funds, are those of the Society. The Society will need shortly an annual income of £10,000 if its work is to go on as it should. May we not also hope through the Divisional Associations to secure an individual membership of not less than 10,000 ?

DISCUSSION

The Chairman, Alderman J. Talbot Nanson (Brighton) in opening the session said : Mr. President, Ladies and Gentlemen, I feel I should explain why I am privileged to occupy the Chair of this meeting for your final Session. Yesterday morning the Mayor of Brighton informed you that he was opening and welcoming his 27th and last Conference this municipal year, which terminates on November 9th. That day a new year commences and the first Conference will visit Brighton on the 10th. It has been my duty and pleasure, on behalf of my Committee, to recommend to the Council that invitations should be extended to each of those twenty-seven Conferences and when Mr. Marsh—who has worked so untiringly for the success of this Conference which it must have been as it is the largest you have ever held—invited me to preside at one of the Sessions I thought it appropriate that I should choose the final meeting of the last Conference to be held in Brighton during the present municipal year. All the more appropriate because, during the present week there has been held in the Dome a very important national Conference, a five-and-a-half hours monthly meeting of the seventy-six members of the Brighton Town Council and speeches in connection with the municipal elections in nineteen wards, and as a result there has been more gas and smoke in Brighton during the present week than in all the preceding forty three weeks. Some may have considered it was of small importance to hold this Conference in a town where we know little of nuisance caused by smoke and where for two days you have been enjoying the "champagne air" of Brighton. But what of the future ? Industry is spreading and must spread, extending from the over-crowded areas in the North and

Midlands and eyes are turning toward the South Coast. In Brighton we are to have industries, mostly of a light description, and rightly so ; we shall welcome them, as I am certain all our neighbours will do. Is it not therefore necessary that each Local Authority should in its own interest watch carefully that there is no pollution from smoke into areas which have thus far been exempt ? Smoke prevention is as important as smoke abatement. In fact I might distort an old adage by saying " Prevention is better than abatement." The building of new houses, blocks of flats, etc., all call for the same watchful eye. The good work done by the Society in the past must not be undone by the possible transfer of the smoke problem from old areas into new ones, and so I hope that any of our neighbouring Authorities who are not members of this Society at the moment—and I am informed that few of them are—will join and strengthen your ranks in the battle still ahead. For these reasons surely your visit is justified. Repeatedly I have said " you " and " yours," forgetting that for some years I have been the representative of the Brighton Corporation on this Society—our Society.

Yesterday I was interested in the discussion concerning the status of the stoker and firemen. As a Warden of the Worshipful Company of Plumbers in the City of London, I wondered whether it would not be possible to introduce a Registration Scheme similar to our own. By this means the National Registration of Plumbers has a system of apprenticeship, whereby a certificate is awarded to the apprentice after he has passed his exams.—and is thereby enabled to add the initials R.P. after his name, proving to his employer that he is a man capable to do the job and being satisfied himself that he is capable and efficient to carry out the job. In his presidential address Sir George Elliston spoke of the anxieties of a certain gentleman. May I suggest that this Society need have no anxiety about its future activities with Sir George Elliston at its head?

Dr. C. F. White (City of London) in opening the discussion, said that he was sure the delegates would wish him to express to Mr. Gandy their appreciation of his excellent paper, which was a very valuable contribution to the proceedings of the Conference. Dr. White understood that he was to speak of the future plans for smoke abatement in the City of London, but he wanted to link his remarks with observations on points which Mr. Gandy had raised in his paper. Mr. Gandy appeared to consider that the future of smoke abatement depended on the creation and extension of smokeless zones, but he said : " the only plan is to take it piecemeal—progressively—clearing the ground as we go." Dr. White was whole-heartedly in agreement with this attitude. He did not remember who coined the phrase " the inevitability of gradualness," but he was certain that it was applicable to smoke abatement.

It had been suggested that little had happened as the result of the activities of the Society during the last 30 years: he would only ask what would have been the situation to-day if there had been no smoke abatement campaign ? Some of them were apt to be deceived by the mirages created by " hot air " and to rush forward only to be disappointed. They had heard many of the difficulties which the campaign against smoke, both domestic and industrial, had to face at the present time, and we could not expect a sudden transformation ; indeed he felt that though the term " smokeless zone " was snappy and had " caught on," it did not convey the idea of a steady extension from quite a small area to a larger and larger one. He preferred the term " non-smoke producing zone." It would be a long time before there was a really smokeless zone in any urban area because, even if the area produced no smoke, smoke would drift into it, or over it, from neighbouring areas, and the term smokeless zone might therefore come to be ridiculed. The Corporation of the City of London had included powers to declare smokeless zones in their recent Various Powers Bill, but in spite of all he could do, the impression had been created that it was the intention to declare the whole of the City a " smokeless zone." As there were in the City several railway termini, a busy section of the River Thames, and a large brewery which fortunately had survived the blitz, there was strong opposition to the proposal. The opponents were not satisfied with an assurance that the declaration of a smokeless zone would begin with a reconstructed blitzed area and would only be extended as was both reasonable and practicable. In view of the fact that it was likely to be some years before reconstruction in the City got underway, it was felt that the smokeless zone clause of the Bill could be dropped for the present and be taken up later, when there was perhaps experience of such legislation elsewhere. The Corporation had however obtained powers to make byelaws requiring prior approval of all new or extensively altered fuel-burning appliances and these powers should at least ensure that only smokeless heat-generating plants were installed in the rebuilt areas of the City. Dr. White noted that Mr. Gandy was in favour of national and regional Smoke Control Authorities and stated that "the proper regional organization of smoke control under statutory boards would demand the service of many highly trained consultants, inspectors and others with expert knowledge." Dr. White was of the opinion that local authorities could manage their own smoke abatement problems provided they had easy access to expert opinion in any difficulty. The local authorities could be perfectly efficient general practitioners provided they could call in consultants in difficult cases, Probably the Fuel Research Department of the Ministry of Fuel and Power could organize a consultant service. In any case he was opposed to the idea of a large increase in the number of inspectors. This country was heading for a state of affairs where half the population was inspecting the other half either directly, or indirectly through forms of one sort or another. What we needed above all was producers of food, of clothing, of consumer goods and of things we could sell to pay our debts.

In the matter of district heating, the City of London was looking to the future. As the audience probably knew, about one-third of the City had been destroyed and much of the destruction was in three concentrated areas where all the buildings were down to basement level. The Corporation, at the instigation of Sir George Elliston, had resolved that the question of supplying these areas with hot water for central heating and domestic purposes, on the District Heating system, was worthy of consideration and had engaged a distinguished consulting engineer to prepare a scheme. Dr. White had no information as to the views of the consultant, but it appeared to him that aggregations of commercial buildings such as would in due course be erected in the devastated areas were eminently suitable for a District Heating Scheme. The requirements would be more easily calculated than in a housing area, and the mains would be shorter. He thought that the owners of buildings would welcome the release of valuable space which would otherwise have to be devoted to individual central heating plants. He understood that a heat-electric system was the most economical, but they had no electricity generating stations in the City. Perhaps it might be possible to erect stations which were primarily for district heating, but where electricity was generated as a by-product and sold to the Central Electricity Board. If they had district heating stations they could control the emission, not only of visible smoke, but also of sulphur compounds, which were at least as important as a menace to health and a cause of damage to buildings, etc.

Professor F. E. Tylecote (Manchester) said he first of all wished to congratulate Mr. Gandy on a most excellent paper, the points made in which would help so much in the struggle before them. He then said that before dealing with the smoke clauses of Manchester's new omnibus Act (1946) he would like to give one or two facts which would be useful to members when addressing meetings or on similar missionary occasions. He referred to the high death rate from respiratory diseases, 1 in 6 or even 1 in 5 in the smoke-laden areas, and to the further fact that 1 in 5 of all "national health" sickness notes were "respiratory." Where death rates were high from these causes the infantile death rate was also high. In 1926, the year of the General Strike. the bronchitis deaths in Manchester fell from 1,279 (1925) to 996, a fall of 22.13%. The actual bronchitis death rate for Manchester was in 1925 1.69 per 1,000, in 1926 it was 1.32 per 1,000. But they must never forget that death or mortality rates were not incidence rates, as the sick notes figure given above showed. Patients with catarrh, bronchitis, asthma and emphysema often did not seek help until the condition was well-established and was really worying them. Smoke was one of the predisposants to these conditions. Carbon particles themselves might do the lung parenchyma no harm, but gritty ones (grit was included in the definition of "smoke") did. It was noticeable in the central streets of Manchester in the General Strike that one could see distant hills which had never before been visible from these points. Manchester was situated in a sort of saucer or depression and it was very difficult for the smoke to get out. " It's a gradely city, ba gum it is, but a fair dirty 'un "—and the rain must be sent by Providence to help them to clean up the dirt. Dealing with the Manchester Corporation Act, 1946 and how it was hoped to implement the smoke provisions therein Professor Tylecote said the smoke provisions of the Act came under three main headings, i.e., smokeless zones, prevention of smoke from new industrial furnaces, and district heating. These provisions represented the first statutory enactments of their kind in the country, but it was worthy of note that in the Manchester Police Act of 1844 there was a clause designed to compel furnaces to consume their own smoke. A central smokeless zone was defined. It is fortunate that no railways existed in the defined area. If the area was extended at all in the future it must contain railways ; therefore a primary necessity must be the electrification of all railways. The provisions of that part of the Act did not apply to smoke coming in from railway locomotives; power was taken to extend the area and to exempt certain premises or to defer the operation of any order in the case of certain premises and specified industrial processes if the Minister was satisfied that the inclusion of the said premises would obstruct the processes named (mining and metallurgical). The smokeless zone clause was not operative until :

(a) the Corporation had consulted the Ministry of Health, and
(b) The Council had then resolved to declare the smokeless zone area, after giving 12 months' notice of the specified date and conditions.

Prevention of Smoke from Industrial Furnaces. This clause was operative from the date of the passing of the Act. It made provision for all new industrial fuel burning appliances and plant within the city to be approved by the Corporation before installation. This was to ensure that as far as practicable (and having regard to cost, local conditions and circumstances) all such furnaces, etc., were capable of being operated continuously without emitting smoke.

District Heating. This section gave the Corporation the necessary basic powers in connection with district heating in the Wythenshawe area. Full details of the scheme were given in a special report of the Housing and Wythenshawe Estate Special Committee and considerable information regarding it was also contained in the " City of Manchester Plan." Briefly one might say that it was planned to provide low pressure hot water and heating to 7,945 houses at a cost of £1,620.942 charging an average of 5s. 1d. a week. Two boiler houses were proposed, one in each industrial zone. The medium for the distribution of heat from the boiler plants to the dwellings was by means of hot water circulated by pumps situate (i) in the boiler houses and (ii) in a number of sub-stations. The mains to the buildings were all placed below ground and in suitable conduits and ducts. It would not be necessary to burn raw fuel in the district concerned except at the central sources of heat generation. A provision was inserted that the Corporation should not create or permit a nuisance in connection with the district heating undertaking. Finally he submitted that the enactments were such as to continue to keep Manchester in the forefront of the smoke abatement campaign.

Alderman E. T. Cozens (Bristol) said there was one point to which he thought it would be helpful to call attention. That was that the Government should give them a lead ; he was sure the right line to adopt was that the local authorities should demand from whatever government was in power that the question of smoke abatement be taken seriously and an Act placed upon the statute book which would make it possible to remove this menace to health and comfort in the shortest time. That would only come when the people demanded it. In the interval they, as local authorities, within their powers, could do quite a lot to pave the way. Perhaps it would not be presumptuous if he detailed some of the steps they had taken in Bristol as their part in the campaign. The need for progress in connection with this matter was foremost in the minds of the Bristol Health Authorities before the outbreak of war. During recent months no opportunity had been lost in reopening the subject with a special emphasis on the **prevention** of smoke pollution in addition to its abatement. Early in 1945 the work of the Bristol and District Regional Smoke Abatement Council was resumed and in June of that year a meeting of the full Council was addressed by Mr. Arnold Marsh, the Society's Secretary. Interest in this matter rapidly developed and a meeting of Bristol City Council Committee Chairmen and principal officers was convened to review the problem and to set administrative machinery into operation whereby the utmost possible would be done during planning and reconstruction to reduce the amount of atmospheric pollution to the minimum.

Many lines of attack were discussed at this meeting including the possibility of creating a smokeless zone in the Central Planning Area, district heating schemes, communal power plants for the new trading estates, together with the installation of smokeless grates and other approved apparatus in the new houses and buildings to be erected. Following a report of this meeting to the Health Committee, it was decided to send a deputation of three members with the Medical Officer of Health and Chief Sanitary Inspector to wait upon the Planning and Reconstruction and Housing Committees in order that still more attention should be focussed upon this important matter. A sympathetic hearing was given the deputation by the Planning and Reconstruction Committee who gave an assurance that the points raised would be kept foremost in the minds of the Committee and officers responsible for reconstruction. Subsequently the Housing Committee came to the clear decision that approved smokeless fuel grates would be installed in all new houses wherever possible. It should be placed on record that the Bristol Health Committee was very appreciative of the assistance which has been rendered by the National Smoke Abatement Society's Secretary, and it was indeed a pleasure to report that the Health Committee were now considering the possibility of establishing a Smoke Control Committee in the City which now had the importance of clean air most firmly established in the minds of all those responsible for planning and reconstruction arrangements. As a "stop press" report to his contribution he was glad to be able to say that all the representatives of the various interested committees in Bristol had now been formed into a Smoke Control Committee and he suggested this was a lead that could be well followed by other local authorities.

Dr. W. A. L. Collier (Member) said he was fresh to the subject of smoke abatement, but had had occasion to read it up during the last few months and was struck with the relationship between industrial and domestic sources of the smoke nuisance. In the past the housewife had looked out of her kitchen window and seen the black smoke emanating from the factory chimney and had therefore been unamenable to domestic smoke abatement. The industrialist on the other hand had succeeded in quoting figures to show that a large fraction, if not more than half, of the pollution of the atmosphere came from the domestic hearth. This situation would, he felt, be described by George Bernard Shaw as progress standing on its head. What was needed was to reverse the situation and stand progress on its feet by presenting the picture to the public in such a way as to institute a popular demand for a competitive reduction in smoke from these two sources. Dr. Collier went on to describe a practical graphical way in which this could be achieved. He first stressed the importance of sticking to a percentage reduction in smoke from these two causes as opposed to any attempt at deciding the absolute amounts produced by each and suggested that a period of about five years could probably best be made to produce a graph that could be used on posters and be easily understood by the general public, the first year on the graph would be used as the index of 100 per cent. and the relative amounts from the two sources would be plotted separately, but both starting from the same point, i.e., 100 per cent. In this way a popular demand would be created for a reduction in smoke from the most offending source. He admitted that in the past the difficulty would have been to find any figures upon which to calculate this comparison. There was hope however, particularly following the scientific survey of "Atmospheric Pollution in Leicester" that in the future a basis for the calculation of such a comparison would be forthcoming.

Dr. W. R. Martine (Birmingham) said he would like to associate himself with the previous speakers in thanking

Mr. Gandy for his very able paper. He would like, however, to take him up on two points of considerable importance as far as the West Midlands was concerned. Mr. Gandy pleaded for Statutory Committees. He thought Dr. Burn had successfully killed that idea at Leeds, when he routed Mr. Law in open debate. They in the West Midlands wanted more statutory powers vested in the local authority—the regional body in their wide and populous area could do far more on an advisory basis. The other point—Mr. Gandy had asked for training of inspectors and operatives. It was up to him he thought to say that they were again holding a course for Smoke Inspectors in Birmingham, while the Joint Education Committee of the Ministry of Fuel and Power and the Institute of Fuel with the assistance of a few co-opted members established courses for boiler and furnace firemen at several of the technical colleges six months ago and had the training at higher levels now also well in hand. He would like to ask whether any thought had been given to the use of oil for new central heating or district heating projects. The army used this method extensively in Italy—with improvised plant—because of the shortage of other fuels, and with great success from heating and smokeless points of view. He could think of one large hospital of 2,000 beds widely spread out in buildings of not more than two storeys where all cooking, space heating and hot water supply was provided for by adapting the 72-inch ranges and central heating boilers to oil fuel.

Leslie Hardern (British Gas Council) said he would like to feel that every delegate to this Conference was going to leave with the definite impression that he had received his marching orders from the Chairman. He had made an attempt to sort out in his own mind what these marching orders were for the various sections represented. They had been gratified to have with them representatives of the Ministry of Fuel and Power who have told them of the setting up of the Inter-departmental Committee to implement the Simon Report. They had also heard that the Coal Board was going to increase the production of suitable smokeless coals. He was not sure whether it was generally appreciated that the Ministry was also in full control of the gas and electricity industries. This meant that all increases in the production and use of these two smokeless fuels could only be obtained with the active help of the Ministry. From the point of view of the Smoke Abatement Society, the Ministry of Fuel and Power was bound to take a major role. Then there was the Ministry of Health. He was sorry that he had not seen a representative of this Ministry at the Conference, and suggested that the deliberations at our Annual Conferences always justified the attendance of a representative of the Ministry of Health. [*The Ministry was represented—Ed.*] They knew that the Parliamentary Secretary had stated publicly that he was willing to make the installation of efficient fuel equipment a condition of subsidy for local authority houses. This was encouraging, but as the Ministry of Health was so vitally concerned in the health results of smoke abatement, they hoped that they would give them more active support in urging their policy in local authorities and in the field of legislation. The Ministry of Supply was also very important. They were responsible for the production of all fuel equipment. By their control of raw materials and plant, they could ensure the production of approved appliances only. They looked to the representatives of the Ministry of Fuel and Power to urge this course upon them. The local authority representatives at the Conference had heard what the more progressive local authorities were doing and would no doubt, be anxious to go back and do likewise in their own areas. The fuel industries had been asked by Mr. Gandy to join in a drive for new membership. He was sure that his friends in the electricity industry and his colleagues in the gas industry would wholeheartedly respond to that appeal. Speaking for himself, he would start on the proposal of showroom posters and forms of enrolment on his return to London on Monday. What about the women ? They had heard at the Conference that they wanted to enlist their help. But what were they doing in their own organizations ? Surely it was up to them to see that smoke abatement was placed high on the agenda of the National Council of Women, the Townswomen's Guilds, the Women's Institutes, the W.V.S., the Co-Operative Women's Guild, and the Labour women's organization. Finally, their own Publicity Committee. Several suggestions for travelling exhibitions had been put forward during the Conference; only that morning an excellent idea was submitted for the use of comparative graphs for editorial articles. He was sure that the Ministry of Fuel and Power would help with the loan of appliances. He hoped they would get on with their publicity work without delay, and come along to next year's Conference with reports on progress.

R. E. Gamlen (Mid-Cumberland Electricity Co., Ltd.) said that many speakers had mentioned the importance of publicity but Mr. Marsh would tell them that this cost money. How were they to get it? The present revenue of an Association of this size and importance was very small. They wanted more members. Could each existing member get two new ones? It was easy to open conversation on the subject of smoke pollution as most people were interested in it. There were those who did not realize to the full the amount of damage smoke could do. For instance, he was asked the other day whether smoke did not help to fertilize the ground. He fully endorsed the last speaker's reference to the importance of interesting women's organizations including the W.V.S. The general cover given by the press to the subject was poor. It was not considered to be of news value The reports of the Conference had been very few. Could they do more to interest the Press and ask the editors and Press lords to become members of the Society? In the provincial Press local Councillors could help generally by seeing that their speeches on smoke abatement were fully reported. He assured Mr. Gandy that the undertakings which he represented as well as others would be only too willing to help by displaying the Society's posters and giving membership particulars.

Councillor H. Stewart (Urmston) said that several points had been mentioned which Urmston's experience disproved. The first was that a purely heat station with no connection to so-called waste heat would be a practical proposition. Second, it was stated that special Acts of Parliament were necessary. For a new district, that would not be the case. Urmston had satisfied the Ministry of Health and Ministry of Fuel and had already commenced on actual construction. The scheme was designed to grow in stages, from 60 to 150 houses, then to 200, later to 600 and finally to 1,300 houses, with 17 public buildings. A temporary boiler plant located in one of the permanent garages and fitted to supply the first 20 houses was actually in operation and serving the first small group of bungalows a fortnight ago. So, far from delaying the work it had expedited by the adoption of the scheme. The costs appeared to be reasonable, though final costs would not be given until a further section had been let. The Council anticipated having between 150 and 200 houses in operation early next year, which proved that schemes could be started without waiting for a large number of houses to be connected. Enquiries had been received from existing houses adjacent to the site to see if the scheme could be extended to include them, and this matter was being investigated, which was proof that there was a demand for these facilities. Unquestionably district heating supplied the best and easiest solution to the smoke problem at the present time. The charges for district heating's services were as follows:

Old age pensioners' bungalows—3s. per week.
4 bedrooms, house of nearly 1,000 sq. ft.—5s. and 5s. 6d. per week.
Smaller houses at a weekly rate between the previous two.

For these charges, heating and constant hot water at a temperature of approximately 140° F. was supplied to the extent of from 35-38 gallons per day. Councillor Stewart was pleased to say that Urmston was the first in the field in this connection, not only with theories and proposals for the future, but in having the scheme already in operation. The distance between the two extremities of the Flixton Housing Scheme, in which the district heating was incorporated, was a little over a mile.

Donald V. H. Smith (Member) said that throughout the conference there had been many hard words said about both industrialists and the Government, and to some extent he thought the Society was barking up the wrong tree. Industrialists for their own sake, must, with the present price of fuel, strive after efficiency, and the nearer they approached to it the closer they were in line with the objects of this Society. The real culprit in smoke pollution was the domestic chimney and there too, to save fuel, the Government had recently gone a long way in the direction this Society desired. There were two publications on the bookstall, one of them free, which appeared to have had little demand, which dealt with this very problem, but instead of asking the Government to compel local authorities to act the onus was on local authorities to use the powers they already possess. It was not necessary for instance to get an Act of Parliament, in order to go ahead with District Heating in new estates. The Ministries concerned had appointed an inter-departmental committee to deal with the very subject, and from personal experience on several proposals recently, he could say that far from doing nothing, they had been very helpful and indeed in some respects were in advance of the Society's activities. If local authorities did not know where to go for technical advice, he was sure an enquiry to either the Ministry of Health or of Fuel, would get them the information promptly. He was a bit dubious of the perpetual call for the central Government to act. He would rather see more activity by the local authorities, and even if 50 per cent. of them did the wrong thing they would soon learn from the 50 per cent. who were successful, whereas if they depended on a single central administration an error in policy might hold up progress indefinitely. In view of the recent schemes approved by the Inter-departmental Committee he had mentioned, and their willingness to assist and consider in any schemes proposed by the local authorities, it was a little ungenerous to be continually baiting the Government and ask for new coercive laws to be enacted. Let the local authorities get busy themselves and use the powers they already had.

A. F. Williams (Ministry of Fuel and Power) said that he would like to make known to the Conference the extent of the activities of the Fuel Efficiency Branch of the Ministry. He said that the aim and purpose of the National Smoke Abatement Society were by no means at variance with the policy of the Ministry of Fuel and Power: in fact, smoke abatement was but one aspect of the larger question of efficient fuel combustion and that if one succeeded in the larger purpose of fuel efficiency, smoke abatement would automatically be achieved. The Fuel Efficiency Branch, through the Fuel Efficiency Committee set up to advise the Minister, had done a considerable amount of work, both on the practical and on the educational side. *Ad hoc* courses of instruction had been given at Technical Colleges and no fewer than 23,000 students had attended these Ministry-sponsored courses.

In each of the twelve defence regions there was a Fuel Efficiency Committee, with its Education Sub-Committee, and recently these Regional Educational Committees had merged with the District Education Committees of the Institute of Fuel, to form Regional Joint Educational Committees. The Institution of Gas Engineers had indicated their desire to be represented on these Joint Committees. Moreover, arising out of consultations with the City and Guilds of London Institute, an elementary syllabus of instruction in boiler house practice had been approved. That course was of a practical nature. A simple examination at the end of the course would entitle each successful candidate to a certificate given by the Technical College at which the course was held. The examination would be supplemented by further practical tests by the Ministry's Engineer or Stoker/Demonstrator. these tests being carried out on the candidate's own boiler plant. This elementary course would lead up to the normal City and Guilds two-year course in boiler house practice and combustion engineering, thence to advance courses and finally to associate membership of the Institute of Fuel. There was thus a continuous educational ladder from the firing floor to the chartered fuel technologist. The Fuel Efficiency Committee had published one text book on "The Efficient Use of Fuel"; would shortly publish a companion volume on "The Efficient use of Steam"; had published 46 technical bulletins and issued a monthly broadsheet entitled "Fuel Efficiency News," with a circulation of something like 40,000. On the practical side visits to factories by Ministry's Engineers had reached the grand total of 60,000. The domestic aspects of fuel economy were also fully taken care of through Regional Fuel Efficiency Organizers. These Organizers, all of whom were women, were responsible for the education of fuel users in the home, and for giving instruction in the use of modern fuel burning appliances. Information Centres were being set up, the first of which would be at London and Glasgow. Mr. Williams also mentioned the Conference "Fuel and the Future" held in London during the early part of October. Turning to supply difficulties, Mr. Williams said that those present should appreciate the difficulties that were experienced by Government departments in keeping the steady flow of materials required for the conversion from war to peace. They were in need of more ships, more houses, more food, plant and equipment of all kinds, more raw materials, and more consumer goods. The only thing we needed less of was smoke!

The difficulty of the central administration was to preserve that balance between one need and another, and whilst enthusiasts for smoke abatement might feel that the highest priority should be given to the production of equipment that would mitigate this nuisance, demands no less urgent and pressing were made by other sections of the community. Within the limits of manpower and materials, what could be done to speed up matters was being done. On district heating, Mr. Williams said that the departments concerned did not need to be convinced of the merits of this form of heating. On the contrary, they were doing everything possible to stimulate its adoption in relation to new housing estates. Three schemes had already been approved by the Inter-departmental Committee set up to consider these matters. Other schemes were the subject of consideration and many more were known to be coming forward. A joint memorandum on "District Heating as Applied to Small Housing Estates" had been prepared by the Ministry of Fuel and Power and the Ministry of Works, and this publication was available free of charge at the bookstall of the Conference. The Egerton Committee on District Heating had brought its labours to an end and its report would soon be issued. It was up to Local Authorities to show that they were prepared to venture into these new methods of heating. They could be assured that they would receive every support from the departments concerned.

Resolutions. The resolutions then considered and adopted are recorded on the following page.

J. W. Beaumont (Vice-Chairman, Executive Council) proposed that a cordial vote of thanks be extended to all who had contributed to the success of the conference, and referred especially to the Mayor and Corporation of Brighton, Councillor Miss D. E. Stringer, Alderman J. Talbot Nanson, the Brighton Publicity Committee and Mr. C. G. Browne, Director of Publicity, Mr. A. E. Lowry, the Mayor's Secretary, Major Jupp of the Royal Pavilion, Mr. A. Howard Holt, Housing Manager, who had kindly made possible the duplication at short notice of the resolutions, Mr. H. Pryce-Jones, Engineer and Manager, Brighton Electricity Department for the invitation for a party to visit the Southwick Power Station that afternoon, and the Society's Secretariat.

David Grant (Executive Council) seconded the vote of thanks, which was then carried with acclamation.

The Chairman, **Alderman J. Talbot Nanson,** in declaring the session and Conference closed, said on behalf of his colleagues, the Mayor of Brighton and Councillor Miss D. E. Stringer (Chairman of Brighton Corporation Health Committee) how delighted they had been to welcome the Society and should be at all times, whether coming for a conference or visiting them as individuals seeking fresh air and entertainment.

RESOLUTIONS

Proposals for resolutions submitted by members of the Conference were considered and correlated by a sub-committee of the Executive Council, on behalf of whom the following five resolutions were proposed. These were duly seconded and carried.

1. That this Conference of the National Smoke Abatement Society views with grave concern the menace to health and amenities caused by the emission of smoke, sulphur and grit from certain electricity generating stations and calls on the Ministry of Fuel and Power and the Central Electricity Board to take immediate steps to obviate the nuisance.

2. That this Conference of the National Smoke Abatement Society requests H.M. Government as a matter of extreme urgency to give a higher priority to the production of efficient smokeless fuel burning appliances, and requests that the payment of subsidy to housing authorities be conditional on the installation of such appliances as soon as they are available.

3. That this Conference of the National Smoke Abatement Society extends its good wishes to the National Coal Board, and is gratified to learn that a progressively increasing production of smokeless fuels is to be in the forefront of its programme, and trusts that, in the interests of both fuel efficiency and smoke prevention, an early start will be made towards the complete disuse of bituminous coal for all domestic purposes.

4. That this Conference of the National Smoke Abatement Society endorses the appeal made in his Presidential Address by Sir George Elliston to all local authorities that are not yet members of the Society to add their strength to the campaign against the nation-wide evil of smoke by becoming members.

5. That this Conference of the National Smoke Abatement Society accepts in principle the proposals for new legislation for Industrial Smoke Prevention, requests the Executive Council to reconsider them in the light of the discussion at this conference, and to take appropriate action.

The following resolution was proposed by Councillor Duffus (Bexley) and seconded:

That this Conference of the National Smoke Abatement Society urges local authorities to take summary action against all offenders against Section 92 (1) (d) of the Public Health Act, 1936.

After discussion the following amendment was proposed and seconded:

That this Conference of the National Smoke Abatement Society instructs the Executive Council to consider in detail this resolution in consultation with the appropriate local authorities.

On a vote the amendment was carried and the resolution not carried.

WELLCOME LIBRARY INSTITUTE

OTHER N.S.A.S. PUBLICATIONS

(*see also inside front cover*)

Smokeless Air.

The Society's quarterly journal. The only magazine in the world devoted to the problems of atmospheric pollution. Gratis to members, or **2/6d.** a year, post free.

Law of Smoke Nuisances.

By W. R. Hornby Steer, M.A., LL.B., Recorder of South Molton, Standing Counsel to the Society. This book, based on an earlier work by Randolph A. Glen and revised and extended in accordance with the Public Health Acts, 1936, may be accepted as a standard work on the subject. In addition to explanatory chapters it contains tables of statutes and the relevant sections from the two Acts and the Local Government Act, 1933. 8vo. 64 pages. **1/-** paper covers; **2/6d.** cloth-bound.

Fumifugium : or the Smoke of London Dissipated.

By John Evelyn. This fascinating book, first published in 1661 by command of Charles II, has been re-published by the Society with an introduction by Rose Macaulay and original woodcuts. This classical indictment of the smoke evil by the author of the famous Diaries remains true, witty and penetrating. **6d.,** paper covers ; **1/6d.** cloth-bound.

To be Published Shortly

N.S.A.S. REPORT, 1947

Containing the Society's Annual Report for 1946 ; lists of Officers, Local Authority Members ; information about the Society and services available to Members ; Subscription list and Statement of Accounts for 1945-46, etc.

Price **3d.** Gratis to Members and Representatives

THE ROYAL SANITARY INSTITUTE
LIBRARY

THE
14th ANNUAL CONFERENCE
1947

of the National Smoke Abatement Society will be held, by kind invitation of the Lord Provost and Corporation, from 1st or 2nd to 4th October, 1947, in the City of

EDINBURGH

Galbraith King & Co., Ltd., Printers, 101, Leadenhall Street, E.C.3.